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ANNOTATED BY-LAWS

AS TO

HOUSE DRAINAGE & SANITARY FITTINGS

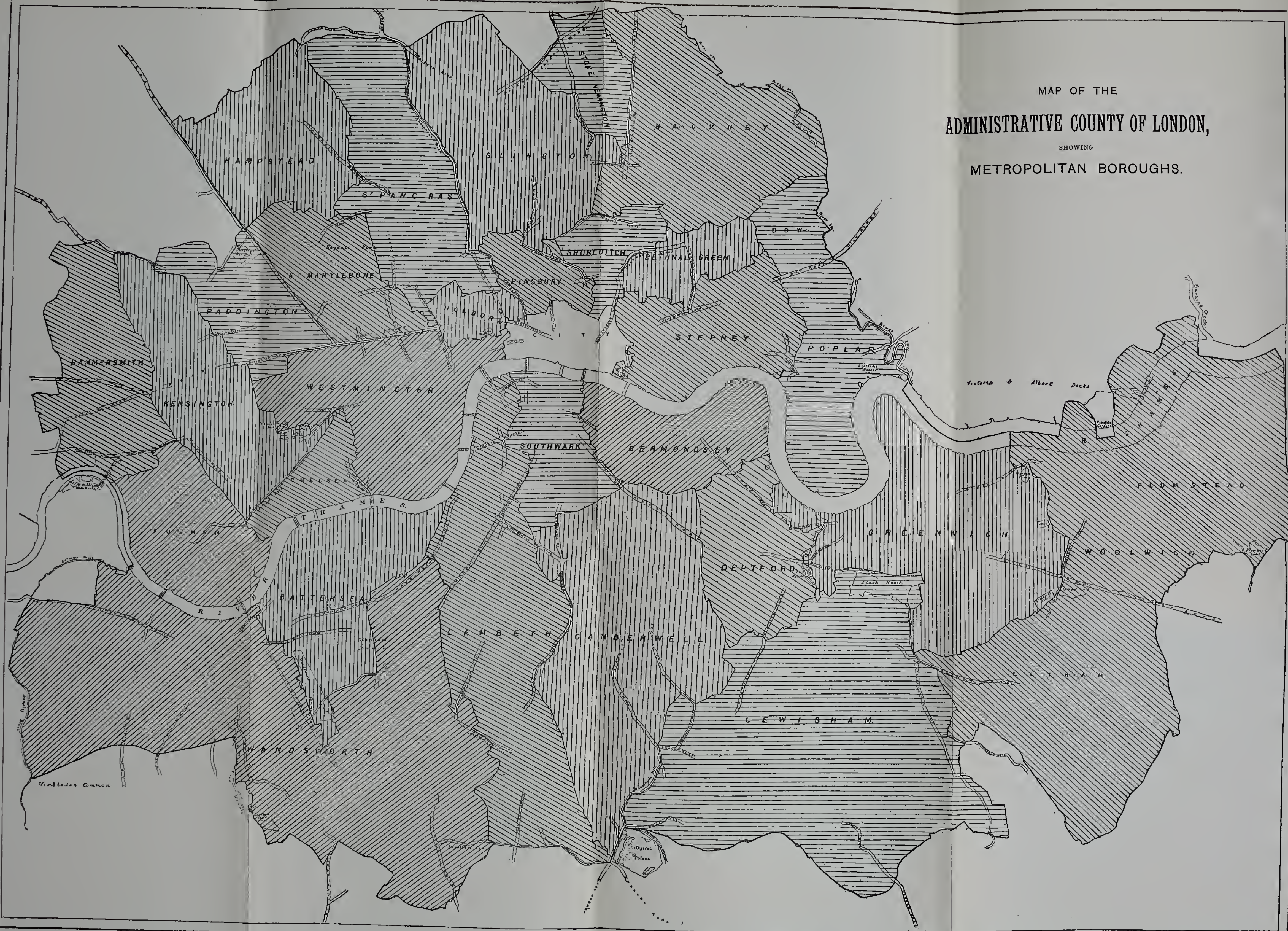


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MAP OF THE
ADMINISTRATIVE COUNTY OF LONDON,
SHOWING
METROPOLITAN BOROUGHES.



BY-LAWS

AS TO

HOUSE DRAINAGE

AND SANITARY FITTINGS

MADE BY

The London County Council.

ANNOTATED BY

GERARD J. G. JENSEN, C.E.,

Author of "Modern Drainage Inspection and Sanitary Surveys," "Cast-Iron Drainage," "House Drainage and Sanitary Fittings," "Modern House Drainage Plans and Diagrams," &c. &c.

AND ANOTHER.

Containing References to the By-laws of various other
Cities in the United Kingdom.

SECOND EDITION.

LONDON :

THE SANITARY PUBLISHING COMPANY, LIMITED,

5, FETTER LANE, E.C.

1908.

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PREFACE.

WITH the sanction given by the Local Government Board on June 14th, 1901, to the new series of by-laws framed by the London County Council under Section 202 of the Metropolis Local Management Act, 1855, a new era, as regards the sanitary administration of the County of London, may be said to have commenced.

Henceforth there will be a uniform code of regulations on the subject of house drainage and sanitary fittings throughout the Metropolis, exclusive of the City, and this in itself will be a great gain to those who in the past have experienced the confusion and inconvenience incidental to the absence of such a code. The new by-laws, moreover, cannot fail to lead to improvement in the general sanitary condition of the Administrative County of London.

In the work of annotating these by-laws and such others as relate to the sanitation of buildings, for the purpose of this volume, effort has been made to indicate the best and most practical method of giving effect to their intentions, and to prevent unintentional infringement by those who might otherwise have doubts as to their meaning. This work has been undertaken by two authors, the name of one of whom

it has been necessary to omit from publication for the present.

In the drafting of the codes of by-laws contained in this volume, the Model By-laws of the Local Government Board issued some twenty years ago have evidently been closely followed, but modifications have been made to bring the by-laws into accord with the requirements of more recent thought.

This annotated edition will, it is hoped, be found useful, not only in London but in urban districts generally, as the by-laws of these districts are mostly based upon the Model By-laws of the Local Government Board, and are therefore very similar in character and wording to those contained in this volume. To fulfil this object more fully the by-laws herein contained have been compared with those of a number of the chief cities in the United Kingdom, and references appended, in the form of footnotes, where they have been found to differ materially. The codes, it is thought, may also serve as excellent models for other Authorities who may desire to make or reconstruct by-laws for their own districts.

GERARD J. G. JENSEN.

14, *Victoria Street, S.W.*,
July, 1901.

PREFACE TO THE SECOND EDITION.

A SECOND edition of this book having been called for, the opportunity has been taken to bring it up to date by the inclusion of the new by-law made under the Metropolis Management Acts (By-laws) Amendment Act, 1899, which, having received the sanction of the Local Government Board, came into force on August 20th, 1903. This by-law has reference to the giving of notices and depositing of plans with Local Authorities. Some difficulty having been experienced by builders and others in preparing the drawings required by the Borough Councils, specimen plans and sections have been given as an annotation, and it is hoped that they may be found useful as guides.

Since the publication of the first edition—three weeks after the by-laws came into force—a number of legal decisions have been given on the by-laws in the Courts, and it is gratifying to find that they have proved the explanations given in this volume to be correct. When sufficient in number, it is proposed to give references to the various Judgments, in the form of an Appendix, in a future edition.

It is a source of satisfaction to know that this volume, primarily written for the use of the professions connected with building, has proved itself serviceable also in the legal world.

GERARD J. G. JENSEN.

14, *Victoria Street, S.W.*, May, 1908.

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INTRODUCTION.

IT is somewhat remarkable that before the year 1901 no by-laws have been made relating to the drainage of buildings in London, although the Metropolitan Board of Works had possessed the necessary power for this purpose since its creation in the year 1855. Explanation of this delay is probably to be found in the fact that London Sanitary Authorities have been able to exercise the powers conferred upon them by Section 73 of the Metropolis Local Management Act, 1855, to require the owner of a house or building within one hundred feet of a sewer, and not having a sufficient drain, to construct a drain and branches " of such materials, of such size, at such level and with such fall as shall be adequate for the drainage of such house or building, and its several floors or storeys, and also of its areas, water-closets, and privies and offices (if any), and for conveying the soil, drainage, and wash therefrom into the said sewer, and to provide fit and proper paved or impermeable sloped surfaces for conveying surface water thereto, and fit and proper sinks, and fit and proper syphoned or

otherwise trapped inlets and outlets for hindering stench therefrom, and fit and proper water supply, and water supplying pipes, cisterns, and apparatus for scouring the same, and for causing the same to convey away the soil, and fit and proper sand traps, expanding inlets, and other apparatus for hindering the entry of improper substances therein, and all other such fit and proper works and arrangements as may appear to the Vestry or Board, or to their officers, requisite to secure the safe and proper working of the said drain, and to prevent the same from obstructing or otherwise injuring or impeding the action of the sewer to which it leads."

There is no doubt that these provisions served a useful purpose during the forty-six years in which they existed, but they did not suffice to secure for London uniformity of procedure, and hence while in some districts the house drainage was required to comply with certain conditions, in others it was not, the differences largely depending upon the different views held by those who advised the local authorities.

In 1891 the London County Council, which had in 1889 succeeded to the powers and duties of the Metropolitan Board of Works, was empowered by the Public Health (London) Act to make by-laws as to

water-closets and the proper accessories thereof in connection with buildings, and at once exercised this power to make by-laws as to water-closets, traps, and soil-pipes. There was, however, no power to make by-laws regulating underground drains under this Act, and the need for such by-laws was increasingly felt. By-laws were accordingly drafted under the Act of 1855, Section 202, but the difficulty of designing a sufficient code which should meet health requirements, and be acceptable to the sanitary authorities and engineers, architects, and builders who would be concerned in its operation, was great, and has largely contributed to the delay in its preparation. Incidental to the making of by-laws under the Metropolis Local Management Act as to the drainage of buildings, was the repeal of the by-laws made under the Public Health (London) Act as to soil-pipes. It was evidently found impossible to provide under the former Act for the ventilation of underground drains without including in the same code the by-laws as to soil-pipes, and the by-laws made under the Public Health Act as to soil-pipes were therefore repealed and included among those made under the Metropolis Local Management Act.

The by-laws which are discussed in this volume com-

prise three codes ; the first made under Section 39 (1) of the Public Health (London) Act, with respect to water-closets, earth-closets, privies, ashpits, cesspools, and receptacles for dung, and the proper accessories thereof in connection with buildings, whether constructed before or after the passing of this Act ; the second, made under Section 202 of the Metropolis Local Management Act, 1855, for regulating the dimensions, form, and mode of construction, and the keeping, cleansing, and repairing of the pipes, drains, and other means of communicating with sewers and the traps and apparatus connected therewith, and the third made under the Metropolis Management Acts Amendment (By - laws) Act, 1899. The first regulate the mode of construction of the several water and earth-closets and privies and receptacles for dung, and the traps with which water-closets and slop sinks are connected ; the second all underground drainage, soil-pipes, rain-water pipes, and the wastes of sinks, baths, and lavatories, while the third deals with the giving of notices and depositing of plans before carrying out the work proposed. The three together deal comprehensively with the whole subject, whether in newly-erected houses or in houses already existing.

In addition to the above-mentioned codes, a portion of a code, under Section 16 (2) of the Public Health (London) Act, dealing with the removal of offensive matter and the closing and filling up of cesspools and privies, will be found in the following pages.

The Public Health (London) Act provides that the by-laws made by the London County Council under that Act shall not extend to the City. The Metropolis Local Management Act of 1855 does not contain any similar provision, but the City is not mentioned in that Act, and hence doubt may arise as to whether by-laws made by the London County Council under it extend to the City or not. It is probable that for this reason the City is especially exempted from their operation. The City Corporation has no power of making by-laws with regard to the drainage of buildings, but the Corporation possesses under its special Acts powers practically identical with those possessed by other London Sanitary Authorities under the Metropolis Local Management Act, and which have been cited above. The City, therefore, in respect of this matter, is in the same position as other London sanitary districts before the making of by-laws by the London County Council.

BY - LAWS

UNDER

The Public Health (London) Act, 1891,

Section 16 (2).

“ The County Council shall make bye-laws—

“ (a) for prescribing the times for the removal or carriage by road or water of any fæcal or offensive or noxious matter or liquid in or through London, and providing that the carriage or vessel used therefor shall be properly constructed and covered so as to prevent the escape of any such matter or liquid, and as to prevent any nuisance arising therefrom ; and

“ (b) as to the closing and filling up of cesspools and privies ; and as to the removal and disposal of refuse, and as to the duties of the occupier of any premises in connexion with house refuse, so as to facilitate the removal of it by the scavengers of the sanitary authority.”

BY-LAW for prescribing the times for the removal or carriage by road or water of any faecal or offensive or noxious matter or liquid in or through London, and providing that the carriage or vessel used therefor shall be properly constructed and covered so as to prevent the escape of any such matter or liquid, and as to prevent any nuisance arising therefrom.

Removal of
faecal and offen-
sive matter

1. Every person who shall remove or carry by road or water in or through London any faecal or offensive or noxious matter or liquid, whether such matter or liquid shall be in course of removal or carriage from within or without or through London, shall not remove or carry such matter or liquid in or through London except between the hours of 4 o'clock and 10 o'clock in the forenoon during the months of March, April, May, June, July, August, September, and October, and except between the hours of 6 o'clock in the forenoon and 12 o'clock at noon during the months of November, December, January, and February. Such person shall use a suitable carriage or vessel properly constructed and furnished with a sufficient covering so as to prevent the escape of any such matter or liquid therefrom, and so as to prevent any nuisance arising therefrom.

Provided that this by-law shall not apply to the carriage of horse dung manure.

NOTE.—The object of restricting the removal of noxious filth to the hours stated in the by-law is, on the one hand, to ensure that there shall be sufficient daylight to admit of the work being done properly and without needlessly offensive operations; and, on the other hand, to avoid, as far as possible, unnecessary inconvenience and offence to

the general public. In daylight the scavengers are, of course, better able to see and to do their work properly, and are at the same time subject to more efficient supervision during the process of removal. Whilst the hours prescribed ensure this, they also cover the period of the day in which the streets and river are least frequented, thus avoiding a certain amount of offence, and rendering speedy transit more probable than were the removal to take place at a later hour. That the carriage or vessel in which noxious matter or liquid is removed should be suitably constructed, is an obviously necessary regulation, as a nuisance is almost certain to be caused in the public thoroughfares during the process of removal if the conveyance is improperly constructed. Such nuisance would arise not only from the effluvia given off by the filth, but also through it being spilled or dropped in the process of cartage, &c. From this it is obvious that the carriage or vessel, or such part thereof as contains the filth, should preferably be both air and water-tight, and indeed *must* be when this is necessary to prevent nuisance. Air and water-tight containers placed in a conveyance would answer equally well, and would be easier to cleanse after emptying.

Horse dung manure, which usually consists of horse dung and straw litter, is excluded from the requirements of the by-law. The more recent use of peat moss litter gives rise to nuisance, and it is probable that the by-law will be modified to meet this difficulty.

BY-LAWS as to the closing and filling up of cesspools and privies.

2. Any person who shall by any works or by any structural alteration of any premises render the further use of a cesspool or privy unnecessary, and the owner of any premises on which shall be situated a disused cesspool or privy, or a cesspool or privy which has become unnecessary, shall com-

Closing and
filling up of
cesspools and
privies

pletely empty such cesspool or privy of all faecal or offensive matter which it may contain, and shall completely remove so much of the floor, walls, and roof of such privy or cesspool as can safely be removed, and all pipes and drains leading thereto or therefrom, or connected therewith, and any earth or other material contaminated by such faecal or offensive matter. He shall completely close and fill up the cesspool with good concrete or with suitable dry clean earth, dry clean brick rubbish, or other dry clean material, and where the walls of such cesspool shall not have been completely removed, he shall cover the surface of the space so filled up with earth, rubbish, or material, with a layer of good concrete 6in. thick.

NOTE. — It will be observed that the emptying, removal and closing of any cesspool or privy which is or has been rendered unnecessary or which has become dis-used, is obligatory. The by-law further prescribes the manner in which such removal and closing shall be effected, the object being to ensure, as far as practicable, the complete removal, not only of the contents of the cesspool, but also of the earth, bricks, drains, and other material which may have become contaminated by the contents. Inasmuch as the cesspool is usually below the surface of the ground, and the existence of a cavity may be a subsequent cause of nuisance or danger, it is required that this cavity shall be filled up with dry material, and where the walls of the cesspool have not been completely removed, that the surface shall be covered with a layer of concrete, in order that noxious air or gases may be prevented from issuing through the ground. Although not required by the by-law, it is well to render the surface of this concrete in Portland cement,

at least $\frac{1}{2}$ in. thick, as the pores of concrete frequently permit gases to pass through. This precaution should, at any rate, be adopted where the site of the cesspool is under a domestic building, as the warmth within the latter has a great tendency to draw air from the soil.

All contaminated earth or other material must, as already stated, also be removed; the rule applying equally to all drains which have been used in connection with the cesspool or privy, and which have been rendered superfluous through the removal of the cesspool or privy. Should it be undesirable, on the score of the safety of the building, or some such other reason, to remove the whole of the drains, the requirements of the by-law will doubtless also be complied with if such portions of the drains as are retained are properly cleansed, disinfected, and filled in with concrete or clean dry material; both ends of each drain being subsequently hermetically sealed. The cartage of any offensive material removed is subject to the requirements of the first by-law.

3. Every person who shall propose to close or fill up any cesspool or privy shall, before commencing any works for such purpose, give to the Sanitary Authority for the district not less than forty-eight hours' notice in writing, exclusive of Sunday, Good Friday, Christmas Day, or any bank holiday, specifying the hour at which he will commence the closing and filling up of such cesspool or privy, and during the progress of any such work shall afford any officer of the Sanitary Authority free access to the premises for the purpose of inspecting the same.

NOTE.—By this by-law, it is required that due notice be given to the local Sanitary Authority as to the day on

which and hour at which it is proposed to commence any of the works specified in the preceding by-law. This is necessary in order that the Sanitary Authority may, if they so wish, exercise complete control and supervision over the works, for which purpose any officer of the Sanitary Authority is ensured free access to the premises, at any time during the progress of such work, by the latter portion of the by-law.

* * * * *

Penalties

12. Every person who shall offend against any of the foregoing by-laws shall be liable for every such offence to a penalty of five pounds, and in the case of a continuing offence to a further penalty of forty shillings for each day after written notice of the offence from the Sanitary Authority. Provided nevertheless that the Court before whom any complaint may be made, or any proceedings may be taken in respect of any such offence, may, if the Court think fit, adjudge the payment as a penalty of any sum less than the full amount of the penalty imposed by this by-law.

NOTE.—This by-law merely prescribes the *maximum* penalties to which a person renders himself liable by non-compliance with the requirements of the foregoing by-laws. The penalties may be reduced by any Court before whom complaint is made or proceedings taken.

* By-laws 4 to 11, both inclusive, have reference to the removal and disposal of house refuse. Being unconnected with the sanitary construction of dwellings, and concerning only occupiers and scavengers, they are not here included.

BY - LAWS

UNDER

The Public Health (London) Act, 1891, Section 39 (1).

“The County Council shall make bye-laws with respect to waterclosets, earthclosets, privies, ashpits, cesspools, and receptacles for dung, and the proper accessories thereof in connexion with buildings, whether constructed before or after the passing of this Act.”

BY-LAWS made by the London County Council with respect to waterclosets, earthclosets, privies, ashpits, cesspools, and receptacles for dung, and the proper accessories thereof in connection with buildings, whether constructed before or after the passing of this Act.

1. Every person who shall hereafter construct a water-closet or earth-closet in connection with a building, shall construct such water-closet or earth-closet in such a position that, in the case of a water-closet, one of its sides at the least shall be an external wall, and in the case of an earth-closet two of its sides at the least shall be external walls, which external wall or walls shall abut immediately upon the street, or upon a yard or garden or open

space of not less than one hundred square feet of superficial area, measured horizontally at a point below the level of the floor of such closet. He shall not construct any such watercloset so that it is approached directly from any room used for the purpose of human habitation, or used for the manufacture, preparation, or storage of food for man, or used as a factory, workshop, or workplace, nor shall he construct any earthcloset so that it can be entered otherwise than from the external air.

He shall construct such watercloset so that on any side on which it would abut on a room intended for human habitation, or used for the manufacture, preparation, or storage of food for man, or used as a factory, workshop, or workplace, it shall be enclosed by a solid wall or partition of brick or other materials, extending the entire height from the floor to the ceiling.

He shall provide any such watercloset that is approached from the external air with a floor of hard smooth impervious material, having a fall to the door of such watercloset of half an inch to the foot.

He shall provide such watercloset with proper doors and fastenings.

Provided always that this by-law shall not apply to any watercloset constructed below the surface of the ground and approached directly from an area or other open space available for purposes of ventilation, measuring at least forty superficial feet in extent, and having a distance across of not less than

five feet, and not covered in otherwise than by a grating or railing.

NOTE.—The requirements of the first paragraph of this by-law—namely, that, in the case of a water-closet apartment, at least one, and, in the case of an earth-closet apartment, at least two* of its sides shall be external walls—are necessary in order that efficient ventilation and lighting may be provided, and the provisions of the by-law following (No. 2) readily complied with. In the case of water-closets, the requirements are also necessary to prevent the use of soil-pipes within the house. Being a source of possible danger, internal soil-pipes are objectionable, and should be avoided. Soil-pipes are, moreover, required to be outside the house, whenever practicable, by the 11th of the drainage by-laws (see page 109), and it will thus be seen that the present by-law will greatly aid the effective application of the latter by making external soil-pipes practicable. The clause also prohibits water-closets from being entered from bedrooms, living or workrooms, or larders; and requires all earth-closets to be entered from the external air, so that they may be completely cut off from the house. No objection is made to water-closets which are entered from entrance halls, staircases, or landings, as no danger can arise from these under ordinary circumstances.

Should any water-closet wall also be the wall of a room intended for human habitation—this being frequently the case—the second clause requires the wall to be constructed in such a way that aërial communication is completely cut off between the closet and the room or rooms which it adjoins. The desirability thereof is apparent, and there is as much reason for the same requirements to be fulfilled in the case of earth-closets, although the latter—doubtless owing to the fact

* *Manchester* and *Dublin* require only one external wall for earth-closets. *Birmingham* requires earth-closets to be at least 6ft. distant from buildings.

that they are rarely provided in London—are not named in this clause of the by-law. The by-law specifies walls of “brick or other materials,” but it should be noted that these must be rendered in cement or plastered, in order to thoroughly fulfil the object desired. In the ordinary way this is done where the walls are exposed to view, but frequently neglected where the walls are hidden by closet enclosures. These portions of the walls are liable to permit vitiated air to pass through defective mortar joints. The ceiling of and that immediately under the closet apartment should also be carefully made, since a defect in these may permit the ascent or descent of smells into the room immediately over or under the closet.

The third paragraph requires that closets which are entered from the external air shall be provided with an impervious floor having a fall towards the door. The fall must not be less than half an inch for every foot in length of the closet floor; the length being measured from the back of the closet to the door. A similar fall from the side walls towards the centre of the floor may also be provided with advantage, the object of the by-law being to ensure that the floor of the closet be kept dry. This recommendation does not, however, necessarily imply the formation of a channel in the closet floor, which, in fact, should be avoided. The floor is also required to be constructed of impervious materials. Of these, the best are probably asphalt, cement, concrete rendered in cement, or tiles set in cement. A properly-laid cement-rendered floor is preferable to all others, as the spaces between the tiles or flags, and the unevenness resulting from wear, render them difficult to keep clean and dry. Wood floors are prohibited (the prohibition being implied), as are also brick and similar absorbent floors which are not efficiently coated with cement on their upper surfaces.

“Proper doors,” such as are required by the fourth clause, will, in the case of water-closets within a house, be held to mean doors which, when closed, will fill the whole of the apertures through which the closets are entered.

In the case of closets which are entered from the external air, louvred doors, or doors which do not quite reach the floor or the ceiling, will be permitted, provided that the openings left do not interfere with the privacy of the closets when the doors are closed. The doors of closets within the house may be advantageously fitted with back springs. These would ensure the closing of the doors and thus enable the closet apartment to be ventilated independently of the rest of the house.

Although the last clause of the by-law states that none of the above requirements shall be applicable under certain specified circumstances ; that is, in the case of a water-closet approached from a suitable area or other open space ; it should be taken to cancel only the provisions of the first paragraph—proper walls, floors, and doors, being desirable under all circumstances. In so far as the clause refers to some of the requirements of the first paragraph, it is also superfluous, since the fact of the closet being entered from an area or open space implies that the closet is provided with an external wall, and that it is not entered from a room intended for human habitation, &c. All that which is essential in the last clause of the by-law is, therefore, that a closet entered from an area, or other open space below the surface of the ground, will only be permitted if such area or space has a superficial area of not less than 40 square feet, is not less than 5ft. in width, and is not covered in in any other way than by a grating or railing.

2. Every person who shall construct a watercloset in connection with a building, whether the situation of such watercloset be or be not within or partly within such building, and every person who shall construct an earthcloset in connection with a building, shall construct in one of the walls of such watercloset or earthcloset which shall abut upon the public way, yard, garden, or open space, as

provided by the preceding by-law, a window of such dimensions that an area of not less than two square feet, which may be the whole or part of such window, shall open directly into the external air.

He shall, in addition to such window, cause such watercloset or earthcloset to be provided with adequate means of constant ventilation by at least one air-brick built in an external wall of such watercloset or earthcloset, or by an air-shaft, or by some other effectual method or appliance.

NOTE.—The object of the first paragraph of this by-law is to ensure the proper lighting and ventilation of the water-closet, or earth-closet, apartment.* Upon these points the cleanliness of the apartment is very largely dependent. When the apartment is formed with more than one external wall, the window specified should be provided in one of the walls other than that in which the door is fixed. In the case of a water-closet in which, however, the only external wall is that in which the door is formed, the window must of necessity be provided upon the same wall. In such a case the by-law may be complied with in three different ways:—(1) By the provision of the required window over the door; (2) by glass panels in the door, and an opening of not less than 2 square feet over the door; and (3) by louvres (whose aggregate openings amount to not less than 2 square feet) in the door, and a fanlight, or other means which will admit sufficient light, over the door.

The second paragraph provides for an additional opening in the apartment. This is essential to ensure a constant movement of air, for unless there be means of ingress as well as egress, there can be no circulation.

* In *Glasgow* the area of the window must be six superficial feet, of which one-half must be made to open.

The secondary opening must communicate with the open air, and should be provided at a point as far away from the window as possible, in order that the aërial contents of the apartment may be thoroughly changed. If possible, it should be provided at or near the highest point in the closet apartment.

3. Every person who shall construct a watercloset Water-closets in connection with a building, shall furnish such watercloset with a cistern of adequate capacity for the purpose of flushing, which shall be separate and distinct from any cistern used for drinking purposes, and shall be so constructed, fitted, and placed as to admit of the supply of water for use in such watercloset so that there shall not be any direct connection between any service pipe upon the premises and any part of the apparatus of such watercloset other than such flushing cistern.

Provided always that the foregoing requirement shall be deemed to be complied with in any case where the apparatus of a watercloset is connected for the purpose of flushing with a cistern of adequate capacity, which is used solely for flushing water-closets or urinals.

He shall construct or fix the pipe and union connecting such flushing cistern with the pan, basin, or other receptacle with which such watercloset may be provided, so that such pipe and union shall not in any part have an internal diameter of less than one inch and a quarter.

He shall furnish such watercloset with a suitable apparatus for the effectual application of water to

any pan, basin, or other receptacle with which such apparatus may be connected and used, and for the effectual flushing and cleansing of such pan, basin, or other receptacle, and for the prompt and effectual removal therefrom and from the trap connected therewith of any solid or liquid filth which may from time to time be deposited therein.

He shall furnish such watercloset with a pan, basin, or other suitable receptacle of non-absorbent material, and of such shape, of such capacity, and of such mode of construction as to receive and contain a sufficient quantity of water, and to allow all filth which may from time to time be deposited in such pan, basin, or receptacle, to fall free of the sides thereof and directly into the water received and contained in such pan, basin, or receptacle.

He shall not construct or fix under such pan, basin, or receptacle, any "container" or other similar fitting.

He shall construct or fix immediately beneath or in connection with such pan, basin, or other suitable receptacle, an efficient syphon trap, so constructed that it shall at all times maintain a sufficient water seal between such pan, basin, or other suitable receptacle and any drain or soil pipe in connection therewith. He shall not construct or fix in or in connection with the watercloset apparatus any D trap or other similar trap.

NOTE.—In the first clause of this by-law are contained two distinct and important requirements. The clause, in the first place, requires all water-closets to be flushed

from cisterns ; and, secondly, prescribes that all such cisterns must be separate and distinct from any in which drinking water is stored. Of these provisions, the first is necessary to ensure a complete break between the closet basin and the water mains, as there is a strong tendency for foul air to be drawn into the service pipes should the latter, through any cause, be emptied. When it is borne in mind that to this evil (which is especially frequent under an intermittent water supply service), numerous outbreaks of typhoid fever and other water-borne diseases have been conclusively traced, the necessity of the requirement will be appreciated. The object of the second requirement, which prescribes the provision of a flushing cistern for water-closets, which is separate and distinct from drinking-water cisterns, is, on the other hand, to preclude the possibility of pollution to drinking water stored in cisterns, as foul air may be communicated to these through the flushing pipe. The by-law does not, however, require a separate cistern to be supplied for each closet, the second paragraph stating clearly that one cistern may be provided for any number of closets so long as the cistern is of suitable capacity.* A requirement of a separate flushing-cistern of two gallons capacity for each water-closet, by the water companies' regulations must, nevertheless, be complied with, except in the case of valve water-closets, when it is not generally insisted upon.

The third paragraph contains the important provision that no part of the flushing pipe which connects the cistern to the closet basin shall be less than $1\frac{1}{4}$ in. in diameter. Were it smaller, a fall of at least 18ft. would be necessary between the cistern and the closet to ensure a good flush. Such a fall is, of course, out of the question in most houses, more especially so in the case of closets fixed upon the upper floors. The clause is also valuable in that it ensures properly-bent flushing pipes, as unskilled workmen are apt to reduce the

* *Belfast* requires that the capacity be "not less than two gallons."

sectional area of a pipe in bending it, and thereby reduce its flushing capabilities.

The fourth clause of the by-law requires suitable apparatus to be provided for the *effectual application of water* to the closet basin, *i.e.*, for its proper flushing. The requirement is somewhat vague, as the words "suitable apparatus" may apply as much to a suitable flushing-rim as to an efficient flushing-cistern or similar appliance. The intention of the by-law is, however, to secure proper flushing of the closet basin. Hence, "suitable apparatus" must be taken to apply neither to the flushing-rim nor to the flushing-cistern, as such, but rather to a combination of these two, or any other appliances or provisions which will ensure the proper cleansing of the closet basin by means of water applied otherwise than by hand. As an example, may be mentioned that the provision of an *efficient* flushing-cistern delivering water into a closet basin through a metal "spreader," or "side-inlet flushing-arm" (as in the case of most hopper closets) would not be considered "suitable apparatus." On the other hand, a sufficient quantity of water, delivered into the basin through a suitable flushing-rim would be deemed to comply with the by-law, even though the water were controlled by, say, a screw-down tap. It should, however, be noted that the last-named would not be permitted by water companies.

In the fifth paragraph is contained the important provision that, whatever type of closet is made use of, the basin must be such as to retain a quantity of water sufficient for the immersion of feces. Its shape must also be such that excreta will fall into the water without fouling the sides. The by-law therefore indirectly prohibits the use of "long hopper" and "short hopper" closets (illustrated in Figs. 1 and 2 respectively) in which the soiling of the basins cannot be avoided. Whilst the clause is scarcely prohibitive of "wash-out" closets—Fig. 3—the water which is retained in the basins of these appliances can scarcely be deemed to be "a sufficient quantity of water." As a matter of fact, the water is quite insufficient both to immerse feces and to prevent

WATER-CLOSETS.

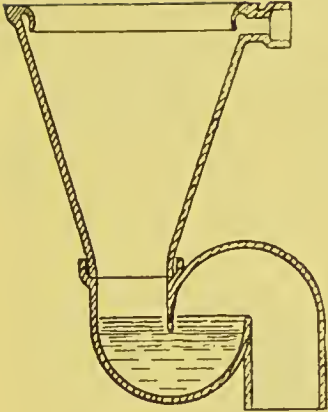


Fig. 1.
"LONG HOPPER" CLOSET.

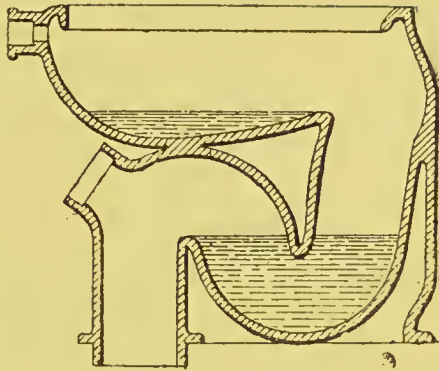


Fig. 3
"WASH-OUT" CLOSET.

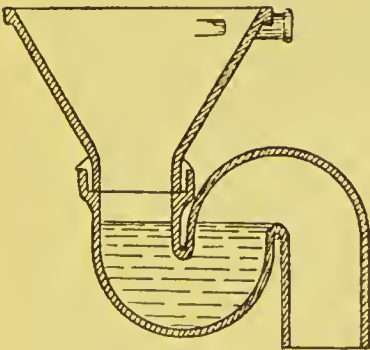


Fig. 2.
"SHORT HOPPER" CLOSET.

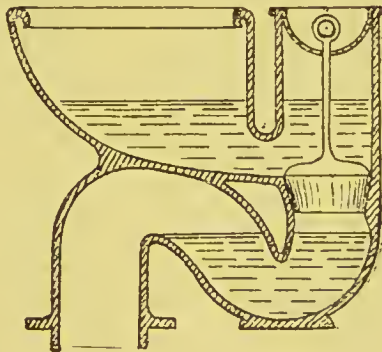


Fig. 4.
"PLUNGER" CLOSET.



WATER-CLOSETS

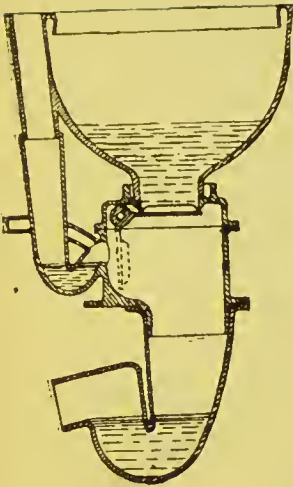


Fig. 5.
"VALVE" CLOSET.

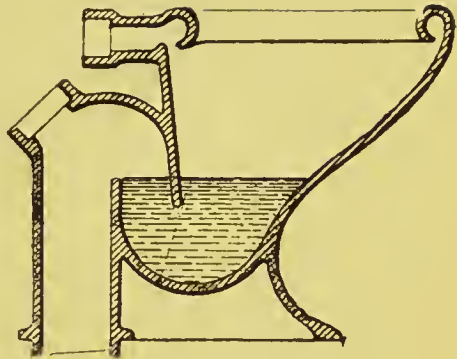


Fig. 7.
"WASH-DOWN" CLOSET.

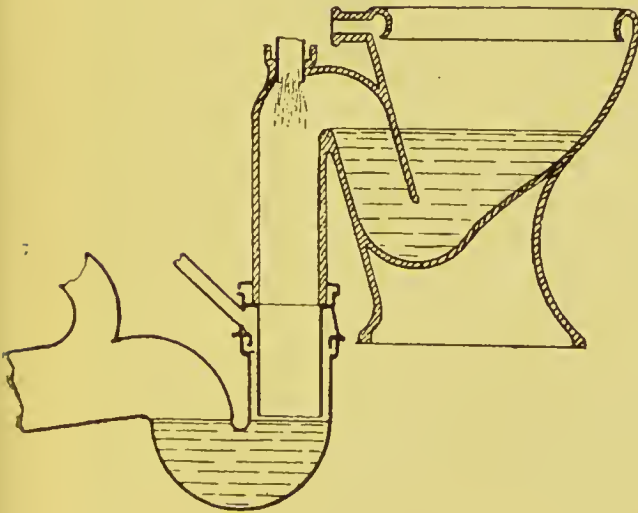


Fig. 6.
"SYPHONIC" CLOSET.

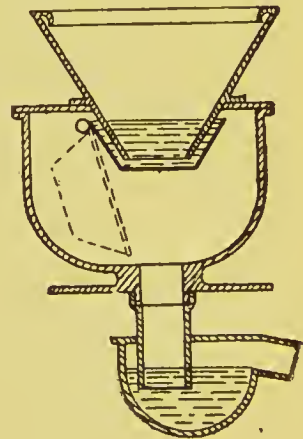


Fig. 8.
"PAN" CLOSET.



the staining of the closet basin, although it is not the "sides" which are soiled. Apart, even, from this consideration, the use of wash-out closets should be avoided, as the fittings are also uncleanly in other parts. When the basin is flushed faecal matter is thrown against the front of the closet, and in time this surface, as also those round the mouth of the trap, becomes coated with offensive matter. The trap also frequently retains a quantity of excreta, as the water flush is broken, and its energy thereby rendered insufficient to clear the trap. It is not improbable that the use of a wash-out closet could be prohibited under the fourth clause of the by-law, owing to retention of faecal matter in the trap. Neither should "plunger" closets (Fig. 4) be used. They are very liable to become foul, and should the plungers be coated with dirt, they may, for a time at least, be incapable of retaining water. Better forms of closets are the "valve," "syphonic," and "wash-down," of which types are shown in Figs. 5, 6, and 7 respectively.

The sixth paragraph prohibits the use of a "container" or similar fitting under a closet basin, and is chiefly aimed against the "Pan" closet, illustrated in Fig. 8. As will be seen from the illustration, the container offers a large fouling area, which in time becomes thickly coated with decomposing filth; the result of the splashing which takes place every time the closet basin is emptied of its contents. Pan closets were generally fixed with a "D" trap—as shown—which is prohibited by the seventh clause of the by-law. These traps are quite as uncleanly as the "container," it being impossible to flush them properly.

Whilst the seventh clause more especially prohibits the use of "D" and similar traps, it also prohibits, by implication, the use of any but syphon traps; the use of trapless closets being also prohibited.* The water "seal" of the trap, which the clause states must be

* *Birmingham* and *Dublin* prohibit only "D" traps, whilst *Liverpool* does not prohibit even these.

"sufficient," is the portion of water retained by the trap between the standing level of the water and the lowest point of the soffit at the dip of the trap (i.e., the

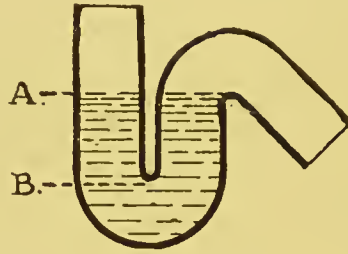


FIG. 9.

water between A and B in Fig. 9). The depth of this portion of water should not be less than $2\frac{1}{2}$ in. in the case of water-closet traps.

N.B.—The last paragraph of by-law 3 and the whole of by-law 4 of this code have been repealed. The last paragraph of by-law 3 has been embodied in the first paragraph of the 17th by-law in the code relating to the drainage of buildings (see page 122), while by-law 4 has become by-law 11 in that code (see page 109).

Water-closets.

5. A person who shall newly fit or fix any apparatus in connection with any existing watercloset, shall as regards such apparatus and its connection with any soil pipe or drain, comply with such of the requirements of the foregoing by-laws as would be applicable to the apparatus so fitted or fixed if the watercloset were being newly constructed.

NOTE.—This by-law refers in part to the—now cancelled—last (eighth) clause of by-law 3 and to the former fourth by-law, which have been repealed and

superseded by by-laws 11 and 17 of the "Drainage By-laws" made under Section 202 of the Metropolis Management Act, 1855. For these see pages 109 and 122.

6. Every person who shall construct an earth closet Earth-closets. in connection with a building shall furnish such earth closet with a reservoir or receptacle, of suitable construction and of adequate capacity, for dry earth, and he shall construct and fix such reservoir or receptacle in such a manner and in such a position as to admit of ready access to such reservoir or receptacle for the purpose of depositing therein the necessary supply of dry earth.

He shall construct or fix in connection with such reservoir or receptacle suitable means or apparatus for the frequent and effectual application of a sufficient quantity of dry earth to any filth which may from time to time be deposited in any receptacle for filth constructed, fitted, or used, in or in connection with such earth-closet.

He shall construct such earth-closet so that the contents of such reservoir or receptacle may not at any time be exposed to any rainfall or to the drainage of any waste water or liquid refuse from any premises.

NOTE.—The requirements of this by-law are essential to ensure an inoffensive and successful earth closet—conditions which are almost wholly dependent upon an ample, suitable, and, above all, *dry* supply of earth. Hence it is necessary to supply the closet with a reser-

voir in which the earth may be stored, and into which it may be conveniently deposited. The object of the earth is to keep dry the excreta, and thus retard its decomposition, and also to gradually disintegrate the organic matter and convert it into the condition in which it naturally exists in fertile soil. For these purposes a loamy soil is the most suitable. Clay is fairly good; whilst sand, gravel and chalk are useless. Ashes have no effect upon the excreta beyond keeping it dry. The earth must, of course, be finely sifted.

The second paragraph of the by-law requires the earth to be applied to the excreta by mechanical means, so as

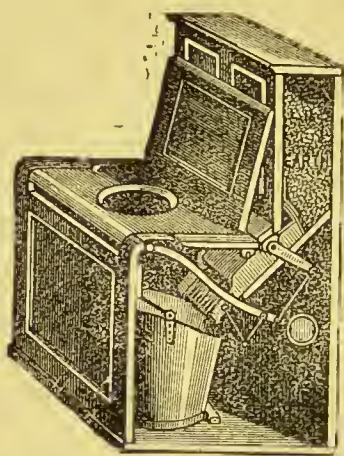


FIG. 10.

to ensure it being done regularly, efficiently, and at the right time. An apparatus which is made for the purpose consists of a valve, at the bottom of the storage box, which is worked either by means of a handle or by a lever attached to the closet seat. When the handle is raised, or a person rises from the seat, the valve opens and distributes a certain quantity of earth over the excreta. This quantity should not be less than a pint and a-half.

The third clause of the by-law is, of course, necessary

to ensure that the earth which is to be used for the closet will remain dry.

The general construction of an efficient earth-closet is shown in Fig. 10.

Although the by-laws permit earth-closets, the apparatus cannot be recommended for the densely populated districts to which the by-laws apply, as there is generally no facility for obtaining suitable earth or for disposing of the contents of the tubs.

7. Every person whoshall construct an earthcloset in connection with a building shall construct such earthcloset for use in combination with a movable receptacle for filth.

He shall construct such earthcloset so as to admit of a movable receptacle for filth, of a capacity not exceeding two cubic feet, being placed and fitted beneath the seat in such a manner and in such a position as may effectually prevent the deposit upon the floor or sides of the space beneath such seat, or elsewhere than in such receptacle, of any filth which may from time to time fall or be cast through the aperture in such seat.

He shall construct such receptacle for filth in such a manner and in such a position as to admit of the frequent and effectual application of a sufficient quantity of dry earth to any filth which may be from time to time deposited in such receptacle for filth, and in such a manner and in such a position as to admit of ready access for the purpose of removing the contents thereof.

He shall also construct such earthcloset so that

the contents of such receptacle for filth may not at any time be exposed to any rainfall or to the drainage of any waste water or liquid refuse from any premises.

NOTE.—The conditions specified in the first three paragraphs of the by-law are essential to the efficient working and scavenging of earth-closets. Whilst, with a suitable and well-kept earth-closet, probably no inconvenience would be experienced from the retention of the soil and excreta for even such a long period as three months, any receptacles holding more than one week's accumulation would be difficult to handle for the purposes of scavenging ; hence the by-law specifies that the maximum capacity of the receptacle must be *two cubic feet*.* The receptacles must be so placed that the stools cannot fall anywhere but into such receptacles, and should be constructed of impervious materials, such as glazed stoneware or galvanised iron. They may also advantageously be provided with wheels, in order to facilitate their withdrawal from under the seat at the time of scavenging. The receptacle or tub is clearly shown in Fig. 10.

The last clause is necessary to keep the contents of the tub dry. Upon this, as already explained in the note to the preceding by-law, the whole success of an earth-closet is dependent.

Privies.

8. Every person who shall construct a privy in connection with a building shall construct such privy at a distance of twenty feet at the least from a dwelling-house, or public building, or any building in

* *Birmingham* permits fixed receptacles holding the excreta, &c., of three months, and limits their capacity to 40 cubic feet. *Dublin* limits the time to one week and the capacity to 9 cubic feet.

which any person may be or may be intended to be employed in any manufacture, trade, or business.

NOTE.—It being practically impossible to construct and maintain a privy in such a way as to preclude the possibility of a “nuisance,” it has been found desirable, in order to minimise risk, to prescribe 20ft.* as the minimum distance from a building at which a privy may be constructed. As this distance is generally unobtainable in town houses, the by-law has a very desirable tendency to prohibit the construction of privies.

9. A person who shall construct a privy in connection with a building shall not construct such privy within the distance of one hundred feet from any well, spring, or stream of water used, or likely to be used, by man for drinking or domestic purposes, or for manufacturing drinks for the use of man, or otherwise in such a position as to render any such water liable to pollution.

NOTE.—Water being very readily polluted by the absorption of noxious effluvia, no less than by actual contact with polluted liquids, the by-law is designed to ensure, as far as possible, the safety of water supplies. From a privy—which, by the way, may at any moment contain the specially poisonous matter of typhoid fever and similar diseases—the chief source of pollution would probably be by leakage; the escaping matter percolating through the ground and finding its way into the well, stream or spring, where such exists.†

* The distance prescribed in *Manchester*, *Birmingham*, and *Dublin* is 6ft. In *Belfast* the distance is 4ft.

† In *Birmingham* the minimum distance from sources of water supply is fixed at 45ft., against London's and *Manchester's* 100ft. In *Dublin* it is 10ft., and in *Belfast* 5ft.

10. Every person who shall construct a privy in connection with a building shall construct such privy in such a manner and in such a position as to afford ready means of access to such privy, for the purpose of cleansing such privy and of removing filth therefrom, and in such a manner and in such a position as to admit of all filth being removed from such privy, and from the premises to which such privy may belong, without being carried through any dwelling-house, or public building, or any building in which any person may be or may be intended to be employed in any manufacture, trade, or business.

NOTE.—This by-law is designed to prevent, as far as possible, a nuisance in connection with the cleansing of privies. Such nuisance is bound to arise when their contents have to be carried through a dwelling-house or other building. Privies must, therefore, be constructed in such a position that they may be emptied and cleansed from a back lane or passage, or from the street. Where these are not available, some other form of closet than a privy must be adopted.

The by-law is doubtless also, to a great extent, meant to aim at the evils of privies and “back-to-back” houses.

11. Every person who shall construct a privy in connection with a building shall provide such privy with a sufficient opening for ventilation as near to the top as practicable and communicating directly with the external air.

He shall cause the floor of such privy to be flagged or paved with hard tiles or other non-absorbent material, and he shall construct such floor so that

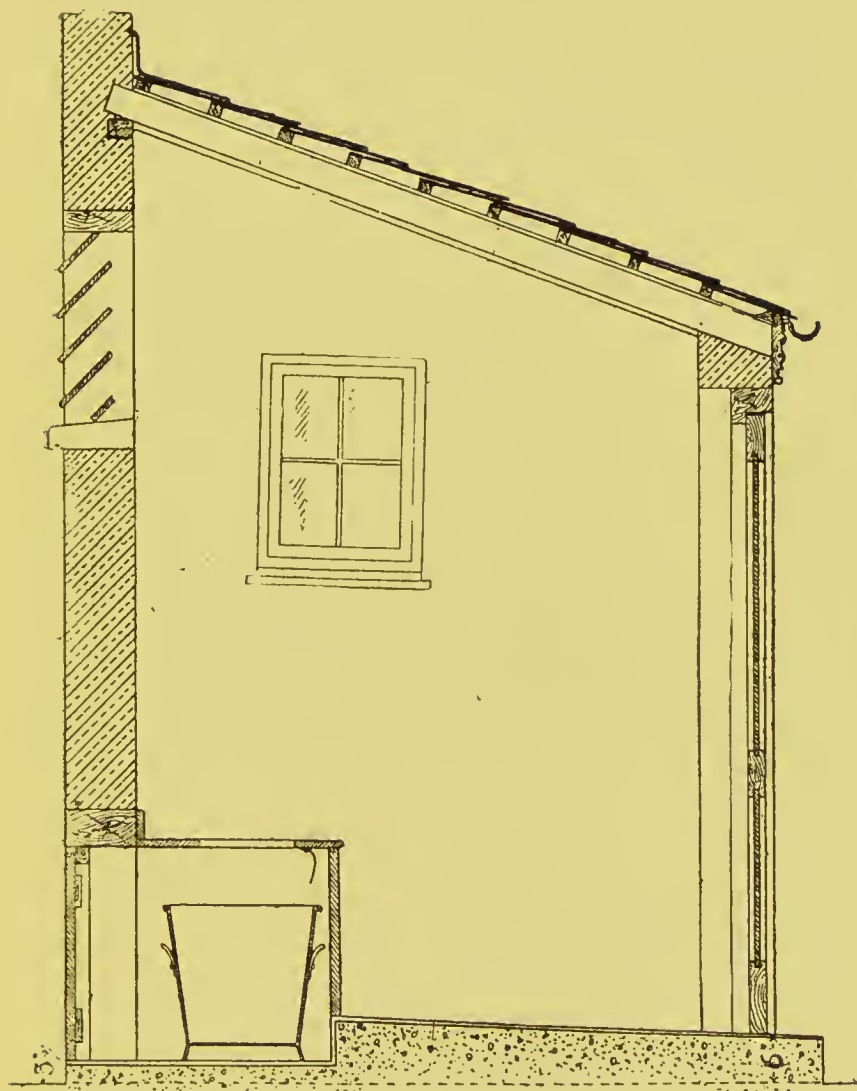


FIG. 11.

D



it shall be in every part thereof at a height of not less than six inches above the level of the surface of the ground adjoining such privy, and so that such floor shall have a fall or inclination towards the door of such privy of half an inch to the foot.

NOTE.—The first clause of this by-law is intended to ensure the proper ventilation and lighting of the privy apartment. The “opening” may take the form of an open window, of louvres, of a hole in the wall, or of a shaft in the roof; the essential points being to provide a sufficient opening for the egress of air, and that the opening be permanent and not a window which can be closed. The opening should preferably have an area of not less than two square feet.

The provisions of the second clause are necessary in order to keep the privy floor dry and to prevent any water used for washing the floor of the apartment from finding its way on to the floor under the seat of the privy, which portion of floor is usually lower than the floor of the privy apartment. (See Fig. 11.) The minimum height of 6in., which the by-law requires for the privy floor, must be provided at its lowest point—that is, at the door, whence the floor must have an upward gradient, towards the seat, at the rate of $\frac{1}{2}$ in. to the foot. As regards the paving, it has already been pointed out in the note to the first by-law that a properly laid cement floor is preferable to all others.

12. Every person who shall construct a privy in connection with a building shall construct such privy for use in combination with a removable receptacle for filth, and shall construct over the whole area of the space immediately beneath the seat of such privy a floor of flagging or asphalte or

some suitable composite material, at a height of not less than three inches above the level of the surface of the ground adjoining such privy; and he shall cause the whole extent of each side of such space between the floor and the seat, other than any part that may be occupied by any door or other opening therein, to be constructed of flagging, slate, or good brickwork, at least nine inches thick, and rendered in good cement or asphalted.

He shall construct the seat of such privy, the aperture in such seat, and the space beneath such seat, of such dimensions as to admit of a movable receptacle for filth of a capacity not exceeding two cubic feet being placed and fitted beneath such seat in such a manner and in such a position as may effectually prevent the deposit, upon the floor or sides of the space beneath such seat or elsewhere than in such receptacle, of any filth which may from time to time fall or be cast through the aperture in such seat.

He shall construct such privy so that for the purpose of cleansing the space beneath the seat, or of removing therefrom or placing or fitting therein an appropriate receptacle for filth, there shall be a door or other opening in the back or one of the sides thereof capable of being opened from the outside of the privy, or in any case where such a mode of construction may be impracticable, so that for the purposes aforesaid the whole of the seat of the privy or a sufficient part thereof may be readily moved or adjusted.

NOTE.—The first point of importance which is provided for by the first clause of this by-law, is that all privies, constructed for the reception of excreta and urine, &c., must be provided with a *removable* receptacle.* The clause further directs that the whole of the space under the seat, in which the “receptacle” is placed shall be constructed of impervious materials in order to prevent the absorption of liquids, should any be spilt. The walls under the seat, unless constructed of flagging or slate, must also be at least 9in. thick, solid, and rendered in cement, whilst the floor must be at least 3in. higher than the surrounding ground. This latter provision is necessary to exclude surface water from the surrounding ground, and also to facilitate the detection of, and thus prevent, wetness resulting from the improper use of the receptacle.

The receptacle provided for the reception of excrementitious matter is by the second clause restricted to a maximum capacity of two cubic feet, in order to prevent all improper use of the privy (such as the emptying out of slops, house-refuse, &c.), and to ensure the frequent removal of its contents. This should be done at least once every week. The same clause requires the general construction of the privy and the placing of the “receptacle” to be such as to ensure that all excrementitious matter will be discharged into its proper place. In this connection it may be pointed out that it is well to provide a urine guide beneath the front of the seat opening, in order that all urine may be discharged into the movable receptacle, and nowhere else (see Fig. 11).

The third paragraph of the by-law requires the privy to be fitted with an external door under the seat, through which the movable receptacle may be taken out and replaced without entering the privy. Should this prove impossible, the clause permits, as an alternative, a removable seat through which the receptacle may be lifted out.

* *Birmingham* permits fixed receptacles, not exceeding in capacity 8 cubic feet.

The general construction of a privy which will comply with the requirements of the by-law is shown in Fig. 11.

13. A person who shall construct a privy in connection with a building shall not cause or suffer any part of the space under the seat of such privy, or any part of any receptacle for filth in or in connection with such privy, to communicate with any drain.

NOTE.—This by-law prohibits the provision of a drain from a privy for a variety of reasons. In the first place, it is found that the drainage of privies has a tendency to choke the drains with which they are connected, owing to the absence of proper means for flushing. Secondly, the provision of a drain is a direct inducement to the misuse of privies, by suggesting that the privy may be used for the reception of slop water. Thirdly, the presence of a drain impedes the prompt detection of wetness, or even dampness, which must not be allowed to exist outside the “receptacle” required by the preceding by-law.

Water-closets,
earth-closets,
and privies.

14. Every person who shall intend to construct any watercloset, earthcloset, or privy, or to fit or fix in or in connection with any watercloset, earthcloset, or privy any apparatus or any trap or soil pipe, shall, before executing any such works, give notice in writing to the clerk of the Sanitary Authority.

NOTE.—The notice which this by-law requires to be given to the Local Sanitary Authority is necessary in

order that its officers may see that the provisions of the foregoing by-laws are properly complied with. To give such notice is also in the interests of the person who proposes to construct or alter the works specified, as it will ensure that his work is carried out in a proper and sanitary manner should he not have been properly advised. In the end it may also prove beneficial to his pocket, as works wrongly carried out in the first place must be altered to conform with the by-laws.

15. Every owner of an earthcloset or privy existing at the date of the confirmation of these by-laws shall, before the expiration of six months from and after such date of confirmation, cause the same to be reconstructed in such manner that its position, structure and apparatus shall comply with such of the requirements of the foregoing by-laws as are applicable to earthclosets or privies newly constructed.

Earth-closets
and privies.

NOTE.—As it is now considerably more than six months since these by-laws were confirmed by the Local Government Board, thereby coming into force, this by-law may be taken to require all earth-closets and privies, whether existing or proposed to be built, to conform in all respects with such of the preceding by-laws as are applicable to earth-closets and privies.

16. When any person shall provide an ashpit in connection with a building, he shall cause the same to consist of one or more movable receptacles sufficient to contain the house refuse which may accumulate during any period not exceeding one

Ashpits

week. Each of such receptacles shall be constructed of metal, and shall be provided with one or more suitable handles and cover. The capacity of each of such receptacles shall not exceed two cubic feet.

Provided that the requirement as to the size of each of such receptacles shall not apply to any person who shall construct such receptacle or receptacles in connection with any premises to which there is attached as part of the conditions of tenancy the right to dispose of house refuse in an ashpit used in common by the occupiers of several tenancies, but in no case shall such ashpit be of greater capacity than is required to enable it to contain the refuse which may accumulate during any period not exceeding one week.

NOTE.—Although an ashpit has been defined as “any ashtub or other receptacle for the deposit of ashes, faecal matter or refuse,” its meaning, in so far as the present by-laws are concerned, should be taken to be a receptacle provided for the reception of ashes and other house refuse. The proper place for faecal matter is certainly not the ashpit. The latter should, indeed, only be used for such refuse as is not liable to decomposition, if a nuisance is to be avoided. Cabbage leaves and offal from fish, flesh or fowl, as all other organic refuse, should be burnt by each householder, and not disposed of in the ashpit. The latter practice, which is, unhappily, only too prevalent, cannot be too severely condemned.

The object of restricting the capacity of an ashpit—or, more correctly, ash-bin—to such proportions as will only contain one week's refuse is, of course, to ensure the frequent removal and disposal of the refuse, and partly also to ensure the provision of a receptacle

which is not too large or too heavy to be carried to the dust cart and emptied into it, thus avoiding the necessity of transference of the contents from the ashpit into a basket for the purpose of their conveyance to the dust cart. A comparatively small receptacle is also easier to keep clean. As will be noticed, each ash-bin must not have a greater capacity than 2 cubic feet. Should the weekly accumulation of refuse exceed this limit, a second and even a third or more receptacles may be provided. Each ashpit must be removable,* of metal (galvanised iron

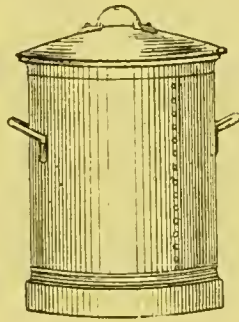


FIG. 12.

answers the purpose admirably), and fitted with a cover and handles. The cover is, of course, meant for the exclusion of rain (dampness aiding putrefaction), and the handles for facilitating removal. An ashbin which complies with these requirements is shown in Fig. 12.

* *Manchester* permits built or fixed ashpits if 6ft. away from buildings and 100ft. from water supply, and if in position which permits contents to be removed without being carried through house. *Birmingham's* requirements are similar; the distances being, however, fixed at 6ft. and 35ft. respectively, and the capacity limited to contain one week's refuse if this does not occupy more than 6 cubic feet. *Dublin* fixes the distance of fixed ashpits from buildings at 6ft., and at 10ft. from water supplies; and *Belfast* fixes them at 2ft. and 3ft. respectively for ashpits proper, and at 4ft. and 5ft. if used also as privies, and specifies the capacity as "not exceeding in any case 24 cubic feet nor less than 16 cubic feet." *Glasgow* requires ashpits to be 6ft. distant from occupied buildings.

In connection herewith it should be stated that a *round* bin is preferable to one which is square, owing to the smaller number of angles provided. The bin should rest upon wheels, or on the rim of its bottom, and not on the whole surface of the latter. This is necessary to prevent its being damaged.

It will be noticed that the second clause of the by-law, although using the words "shall *construct* such receptacle," exempts ashpits used in connection with more than one tenancy, from the above requirements, *only* as regards *size*. That is, such ashpits may be of larger capacity than 2 cubic feet, always providing that each does not exceed one week's storage. In their *construction*, however, they must comply with the requirements of the first clause; a prohibition against *built* ashpits (of brickwork or otherwise) being thus implied, in spite of the words "shall construct."

17. The occupier of any premises who shall use any ashpit shall, if such ashpit consist of a movable receptacle, cause such receptacle to be kept in a covered place, or to be properly covered, so that it shall not be exposed to rainfall, and if such ashpit consist of a fixed receptacle, he shall cause the same to be kept properly covered.

NGTE.—The object of this by-law is to ensure that rain will be excluded from the contents of the ashpit, so that its decomposition may not be favoured by wetness. This duty is not unnaturally made to devolve upon the user, who is thus required to replace the lid on the ashbin whenever the latter is used, or to otherwise efficiently cover it when a lid is not provided. The requirement in connection with *fixed* receptacles is, at first sight, at variance with the preceding by-law, which insists upon *removable* ashpits. It is, of course, explained by the fact

that fixed ashpits were in existence prior to the date on which these by-laws came into force. All receptacles provided after the by-laws came into force must be movable.

18. Where the Sanitary Authority have arranged for the daily removal of house refuse in their district, or in any part thereof, the owner of any premises in such district or part thereof shall provide an ashpit which shall consist of one or more movable receptacles, sufficient to contain the house refuse which may accumulate during any period not exceeding three days, which the Sanitary Authority may determine, and of which the Sanitary Authority shall give notice by public announcement in their district. Each of such receptacles shall be constructed of metal, and provided with one or more suitable handles and cover. The capacity of each of such receptacles shall not exceed two cubic feet.

Provided always that this by-law shall not apply to the owner of any premises until the expiration of three months after the Sanitary Authority have publicly notified their intention to adopt a system of daily collection of house refuse in that part of their district which comprises such premises.

NOTE.—This by-law is intended to encourage and to give opportunity for the institution in London of a daily removal of house refuse. A Sanitary Authority which has decided to remove the refuse daily from the whole or any part of their district can require house-

holders whose refuse will be thus removed to provide movable receptacles, even in cases where fixed ashpits were in existence prior to the time at which these by-laws came into force. The by-law in certain cases further restricts the capacity of the receptacles required by the 16th by-law. When the removal of refuse takes place daily, there is, of course, no need for a storage capacity sufficient for a week's refuse. The by-law therefore requires that under such circumstances each receptacle shall not be greater than sufficient for a three days' storage (which is evidently intended to cover non-removal on Sunday), and empowers the Local Sanitary Authority to still further reduce this number of days. The Sanitary Authority must, however, make its requirements known by a public announcement in their district, and the owner is, by the second clause, given a three months' grace in which to comply with such requirements. The rule that even under such circumstances the maximum capacity of each receptacle shall not exceed 2 cubic feet is necessary, as there are numerous establishments in which this quantity may be exceeded in even one day, and thus unless prohibited lead to the use of a large receptacle, which may be difficult or impossible to move.

19. Where any receptacle shall have been provided as an ashpit for any premises in pursuance of any by-law in that behalf, no person shall deposit the house refuse which may accumulate on such premises in any ashpit that does not comply with the requirements of these by-laws.

NOTE.—The London County Council having no power to make a by-law requiring the demolition of old fixed receptacles when movable receptacles have been provided, this by-law has been framed with the object of

preventing the utilisation of improper receptacles, after movable receptacles which comply with the requirements of the preceding by-laws have been provided.

20. Every person who shall construct a cesspool ^{Cesspools.} in connection with a building, shall construct such cesspool at a distance of one hundred feet at the least from a dwelling house, or public building, or any building in which any person may be, or may be intended to be, employed in any manufacture, trade, or business.

NOTE.—The County Council has no power to prevent the use of cesspools, but the necessity for these in the districts to which the by-laws apply will but rarely, if ever, occur. Cesspools should only be resorted to in districts in which there are no sewers, and even then better means of disposal may be adopted in the light of our present knowledge. At the best, ordinary cesspools are a source of nuisance and danger to health, owing to the possibility of leakage of either liquids or gases. To minimise these dangers, and to discourage the use of cesspools, the by-law requires that these shall be built at least one hundred feet away from domestic buildings—a distance which is not attainable in populous districts.*

21. A person who shall construct a cesspool in connection with a building, shall not construct such cesspool within the distance of one hundred feet from any well, spring, or stream of water.

* In *Birmingham* the distance is 50ft.; in *Dublin* 10ft.

NOTE.—The requirements of this by-law are made with a view of minimising the risk of pollution to water which may follow a leakage from the cesspool. Such leakage is always liable to take place, as even an originally well-constructed cesspool is apt to become defective. See also note to preceding by-law.*

22. Every person who shall construct a cesspool in connection with a building, shall construct such cesspool in such a manner and in such a position as to afford ready means of access to such cesspool, for the purpose of cleansing such cesspool, and of removing the contents thereof, and in such a manner and in such a position as to admit of the contents of such cesspool being removed therefrom, and from the premises to which such cesspool may belong, without being carried through any dwelling-house, or public building, or any building in which any person may be, or may be intended to be, employed in any manufacture, trade, or business.

He shall not in any case construct such cesspool so that it shall have, by drain or otherwise, any means of communication with any sewer or any overflow outlet.

NOTE.—The object of the first clause of this by-law is to ensure that the construction and position of cesspools be such as to provide all facilities for their proper emptying and cleansing, and also to make sure that such operations be carried out with the least possible risk of

* The distance prescribed in *Manchester* is 200ft., as against *London's* 100ft. In *Birmingham* it is 80ft.; in *Dublin*, 10ft.; and in *Belfast*, 50ft

nuisance or danger to the inmates of the buildings in connection with which the cesspools are provided, or those adjoining.

The second clause tends to prevent the construction of cesspools wherever sewers are available for the reception of sewage. The reasons for this are obvious.

23. Every person who shall construct a cesspool in connection with a building, shall construct such cesspool of good brickwork bedded and grouted in cement, properly rendered inside with cement, and with a backing of at least nine inches of well-puddled clay around and beneath such brickwork, and so that such cesspool shall be perfectly watertight.

He shall also cause such cesspool to be arched or otherwise properly covered over, and to be provided with adequate means of ventilation.

NOTE.—The requirements of the first paragraph of this by-law are necessary to prevent the possibility of escape from cesspools of any of their liquid or gaseous contents, which, by finding their way into buildings or into the surrounding soil, may constitute a grave danger to health. The mode of construction and the materials to be used are sufficiently indicated in the by-law, and it remains only to be said that the cement rendering should be at least half an inch thick, and brought to a smooth surface.

24. A person shall not use as a receptacle for dung any receptacle so constructed or placed that one of its sides shall be formed by the wall of any

Receptacles
for dung.

room used for human habitation, or under a dwelling-house, factory, workshop, or workplace, and he shall not use any receptacle in such a situation that it would be likely to cause a nuisance or become injurious or dangerous to health.

NOTE.—“Dung” may be taken to apply to any manure, soil, filth or other offensive or noxious matter which may from time to time be produced by, or through, the keeping of any horse or other beast of draught or burden or of cattle or swine. The object of the by-law is, as therein stated, to prevent the creation of a nuisance or danger to health. Nothing would be more probable to cause this than were the receptacle to be situated under a domestic building, or were one or more of its walls, also the wall or walls of a room, intended for human occupation. Such a wall would be bound to become saturated with filth, and to allow noxious liquids or gases to pass through into the house. The receptacle should, in fact, be built at some little distance from the house.

25. Every owner of any existing receptacle for dung shall, before the expiration of six months from the date of the confirmation of these by-laws, and every person who shall construct a receptacle for dung, shall cause such receptacle to be so constructed that its capacity shall not be greater than two cubic yards, and so that the bottom or floor thereof shall not, in any case, be lower than the surface of the ground adjoining such receptacle.

He shall so construct such receptacle that a sufficient part of one of its sides shall be readily removable for the purpose of facilitating cleansing.

He shall also cause such receptacle to be constructed in such a manner and of such materials, and to be maintained at all times in such a condition as to prevent any escape of the contents thereof, or any soakage therefrom into the ground or into the wall of any building.

He shall cause such receptacle to be so constructed that no rain or water can enter therein, and so that it shall be freely ventilated into the external air.

Provided that a person who shall construct a receptacle for dung, the whole of the contents of which are removed not less frequently than every forty-eight hours, shall not be required to construct such receptacle so that its capacity shall not be greater than two cubic yards.

And provided that a person who shall construct a receptacle for dung, which shall contain only dung of horses, asses or mules with stable litter, and the whole of the contents of which are removed not less frequently than every forty-eight hours, may, instead of all other requirements of this by-law, construct a metal cage, and shall beneath such metal cage adequately pave the ground at a level not lower than the surrounding ground, and in such a manner and to such an extent as will prevent any soakage into the ground; and if such cage be placed near to or against any building he shall adequately cement the wall of such building in such a manner and to such an extent as will prevent any soakage from the dung within or upon such receptacle into the wall of such building.

NOTE.—It being now considerably over six months since these by-laws were confirmed and thereby came into force, the above by-law requires that *all* receptacles for dung, whether already existing or about to be built, be made to comply with the conditions named. In the first place, no receptacle may exceed a capacity of 2 cubic yards. This is necessary to ensure frequent cleansing. The rule is, however, waived by the fifth clause of the by-law, in the case of receptacles which are regularly emptied at least once in every forty-eight hours.

The bottom of the receptacles must not be lower than the surface of the surrounding ground, whilst the structure must be covered, and otherwise so arranged or constructed that rain, subsoil water, and other moisture will be excluded from its contents. This is necessary to prevent the offensiveness which would necessarily follow should the manure become wet or sloppy. The floor of the receptacle should, in fact, be rather higher than the surrounding soil. For the covering, a lean-to roof, or a roof supported upon pillars, may frequently suffice, although much must depend upon the position of the "receptacle." Whilst requiring the exclusion of moisture from the dung, the by-law also prescribes that moisture already in it shall not be permitted to escape, and it is thus obvious that the walls and bottom of the receptacle must be so constructed and maintained as to remain water-tight.

The ventilation required by the latter portion of the fourth clause is necessary in order to diffuse and disperse any noxious effluvia which may arise from the manure, and, as far as possible, to ensure their oxidization. The ventilation may, of course, be carried out in a variety of ways. Ventilation shafts may thus be provided, or spaces left in the sides of the receptacle—above the level of the manure—for the extraction and admission of air. The roof may also be fixed in such manner as to leave a space between it and the receptacle. If raised from the latter by some few feet, facilities for removing the con-

tents will at the same time be provided if the walls of the receptacle are reasonably low. If this mode of construction is adopted, the roof must, of course, be so shaped or of such a size as to prevent rain from driving on to the dung.

The last clause of the by-law exempts from the above requirements, and prescribes other rules for any receptacle which is provided exclusively for the reception of dung from horses, asses or mules ; provided that such dung is mixed with stable litter (straw, &c.), and that the

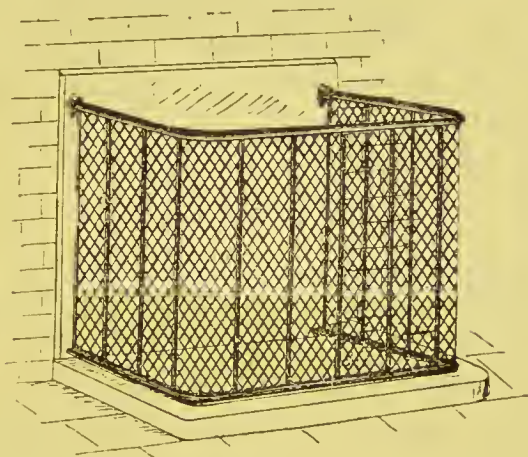


FIG. 13.

dung and litter is totally removed at least once in every forty-eight hours. In such cases the dung may be stored in metal cages (see Figs. 13 and 14), if the surrounding walls and ground are rendered impervious. Should these cages be adopted, they should preferably be galvanised or otherwise protected against rust, unless constructed of non-corrosive metal. The material employed should also be such as is not acted upon by the salts and acids present in the manure. The more recent use of peat moss litter instead of straw tends to render horse dung offensive, and it is not improbable that this clause will be modified to meet the difficulty.

It should be noted that the Council is in every way anxious to encourage the *daily* removal of all dung from all sources. The stipulations as to removal "at least

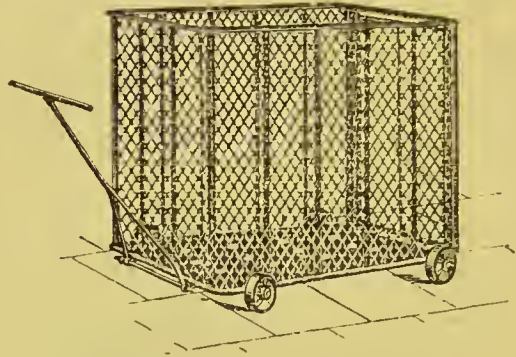


FIG. 14.

once in forty-eight hours," which occur in the by-law are intended to cover non-removal on Sundays.

Cleansing of
water-closets,
earth-closets,
privies, and
receptacles for
dung.

26. The occupier of any premises shall cause every watercloset belonging to such premises to be thoroughly cleansed from time to time as often as may be necessary for the purpose of keeping such water-closet in a cleanly condition.

The occupier of any premises shall once at least in every week cause every earthcloset, privy, and receptacle for dung belonging to such premises to be emptied and thoroughly cleansed.

The occupier of any premises shall once at least in every three months cause every cesspool belonging to such premises to be emptied and thoroughly cleansed.

Provided that where two or more lodgers in a lodging-house are entitled to the use in common of any watercloset, earthcloset, privy, cesspool, or receptacle for dung, the landlord shall cause such watercloset, earthcloset, privy, cesspool, or receptacle for dung to be cleansed and emptied as aforesaid.

The landlord, or owner of any lodging-house, shall provide and maintain in connection with such house, watercloset, earthcloset or privy accommodation in the proportion of not less than one watercloset, earthcloset, or privy, for every twelve persons.

For the purposes of this by-law, "a lodging-house" means a house or part of a house which is let in lodgings or occupied by members of more than one family. "Landlord" in relation to a house or part of a house which is let in lodgings, or occupied by members of more than one family, means the person (whatever may be the nature or extent of his interest) by whom or on whose behalf such house or part of a house is let in lodgings or for occupation by members of more than one family, or who for the time being receives or is entitled to receive the profits arising from such letting. "Lodger" in relation to a house or part of a house which is let in lodgings or occupied by members of more than one family, means a person to whom any room or rooms in such house or part of a house may have been let as a lodging or for his use or occupation.

Nothing in this by-law shall extend to any common lodging-house.

NOTE.—This by-law contains a number of useful and

necessary regulations for securing regular and efficient cleansing and scavenging, of which the value cannot be over-estimated. The by-law also contains a number of useful definitions for facilitating the enforcement of its requirements.

The by-law appears to put the duty of emptying and cleansing of earth closets, privies, and cesspools on the occupier of premises. Section 30 of the Public Health (London) Act, however, provides that it is the duty of the Sanitary Authority to secure the emptying and cleansing of earth closets, privies, and cesspools, and the by-law must not therefore be interpreted to mean that the Sanitary Authority is relieved of its responsibility under the Act, but rather that the occupier should keep the Sanitary Authority up to the mark in case of neglect.

Maintenance of
closets, &c.

27. The owner of any premises shall maintain in proper condition of repair every watercloset, earthcloset, privy, ashpit, cesspool, and receptacle for dung, and the proper accessories thereof belonging to such premises.

NOTE.—The definition of an “owner” is:—The person for the time being receiving the rack-rent of the lands or premises in connection with which the word is used, whether on his own account, or as agent or trustee for any other person, or who would so receive the same if such premises were let at a rack-rent.

The expression “rack-rent” means rent which is not less than two-thirds of the full annual value of the premises out of which the rent arises; and the full annual value is to be taken to be the annual rent which a tenant might reasonably be expected, taking one year with another, to pay for the premises if the tenant undertook to pay all usual tenant’s rates and taxes, and the tithe commutation rent-charges (if any), and if the landlord undertook to bear the cost of the repairs and

insurance, and other expenses (if any) necessary to maintain the premises in a state to command such rent.

28. Every person who shall offend against any ^{Penalties} of the foregoing by-laws shall be liable for every such offence to a penalty of Five pounds, and in the case of a continuing offence to a further penalty of Forty shillings for each day after written notice of the offence from the Sanitary Authority. Provided nevertheless that the Court before whom any complaint may be made or any proceedings may be taken in respect of any such offence may, if the Court think fit, adjudge the payment as a penalty of any sum less than the full amount of the penalty imposed by this by-law.

NOTE.—This by-law prescribes the maximum penalties which may be imposed for non-compliance with the preceding by-laws. The amounts may be reduced by any Court before whom complaint is made or proceedings taken. The imposition of greater penalties is illegal.

London County Council.

DRAINAGE BY-LAWS.

The Metropolis Local Management Act, 1855, Section 202.

“The Metropolitan Board of Works . . . may from time to time make, alter, and repeal bye-laws . . . for regulating the dimensions, form, and mode of construction, and the keeping, cleansing, and repairing of the pipes, drains, and other means of communicating with sewers, and the traps and apparatus connected therewith (for the emptying, cleansing, closing, and filling up of cesspools and privies, and for other works of cleansing, and of removing and disposing of refuse) . . .”

BY-LAWS made by the Council for regulating the dimensions, form, and mode of construction, and the keeping, cleansing, and repairing of the pipes, drains, and other means of communicating with sewers and the traps and apparatus connected therewith.

1. A person who shall erect a new building and shall cause the subsoil of the site of such building

Drainage of sub-
soil.

to be drained by means of a drain communicating with any sewer, shall not construct such subsoil drain in such a manner or in such a position as to communicate directly with such sewer, but shall provide a suitable and efficient trap between such subsoil drain and such sewer.

He shall provide a ventilating opening to such trap at a point in the line of such subsoil drain as near as may be practicable to such trap, and communicating directly with the open air.

He shall cause such ventilating opening to be furnished with a suitable grating or other suitable cover for the purpose of preventing any obstruction in or injury to any pipe or drain by the introduction of any substance through such opening. He shall cause such grating or cover to be so constructed and fitted as to secure the free passage of air through such grating or cover by means of a sufficient number of apertures, of which the aggregate extent shall be not less than the sectional area of the pipe or drain to which such grating or cover may be fitted.

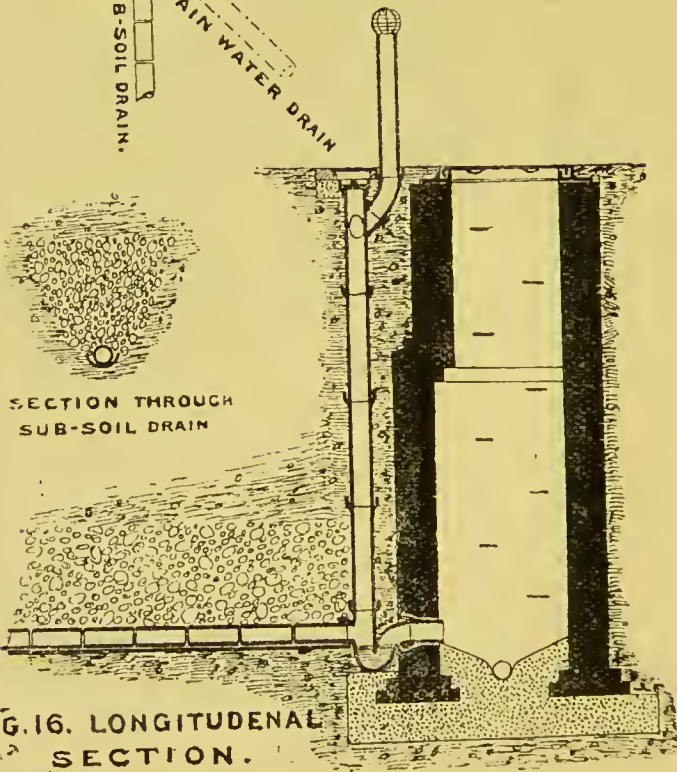
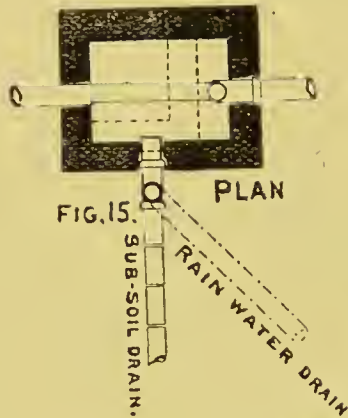
He shall cause such subsoil drain between such trap and such sewer to be constructed in manner prescribed by the by-laws in that behalf for a drain used for conveying sewage.

He shall cause such subsoil drain above such trap to be formed of suitable earthenware field pipes properly laid to a suitable fall and to discharge into such trap.

NOTE.—The intention of this by-law is to prevent the



DETAILS OF SUB-SOIL DRAIN AND ITS DISCONNECTION.



possibility of air from a sewer passing beneath, and thence into, a house by means of the drain provided for draining the subsoil of the building into the sewer.* The best way to comply with the by-law is to provide a "Buchan" or similar trap at the point at which the subsoil drain joins the sewer or other foul drain, or as near thereto as may be practicable, and to lead the subsoil drain into it, as shown in the sketches Figs. 15 and 16. An ordinary syphon trap, of suitable design, fixed in an inspection chamber would, of course, be even better; but, inasmuch as the drain will, as a rule, only be called upon to carry off water, and, in most cases, but little of that, the cost of the chamber will be an unnecessary outlay. If an inspection chamber upon a sewage drain is conveniently situated, the subsoil drain may, however, after trapping, be advantageously branched into it (see Fig. 16). Where this is not available, and the ground is very wet, a special inspection chamber will, nevertheless, be very desirable, as, by its means, it can be readily ascertained whether the drain is acting properly, and whether the trap and drain beyond are free from blockage. In any case, that is, whether an inspection chamber is provided or not, the trap must be provided solely for the subsoil drain, and must not receive the discharge of any drain conveying sewage or other contaminated water. On the other hand, it will be advantageous to permit a rain-water drain to discharge into the trap—see dotted lines in Fig. 15—in order that it may assist in keeping the trap free of deposit and charged with water. A fresh-water tap will serve a similar purpose if allowed to discharge into the trap, from time to time, during dry weather. Although the by-law does not (probably owing to the wording of the section under which it is made), specifically prohibit the direct connection of a subsoil drain to a drain conveying

* It should be noted that whereas London merely makes provisions for cases in which a subsoil drain is provided, *Liverpool, Manchester, Birmingham, Dublin*, and most other cities require the provision of subsoil drains when necessary.

sewage, or which communicates directly with a sewage drain, such a connection is quite as undesirable as the direct connection of the subsoil drain to a sewer; foul air from a sewage drain being as liable to enter the subsoil drain as that from a sewer.* A subsoil drain discharging into a foul drain should, therefore, be trapped in a similar manner to a subsoil drain which discharges into a sewer.

In the case of a "Buchan" trap, the ventilation opening required by the second paragraph of the

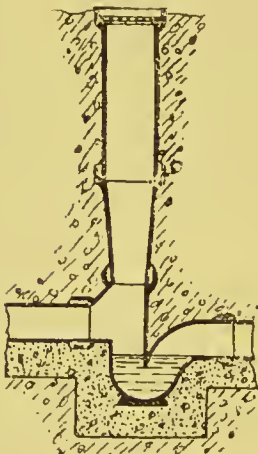


FIG. 17.

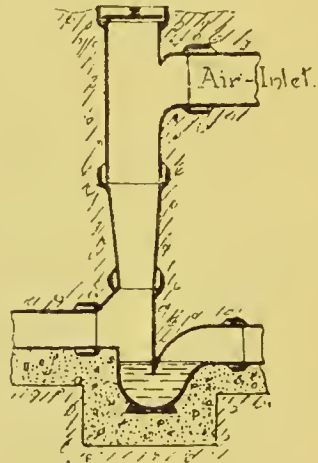


FIG. 18.

by-law, is best provided on the shaft of the trap, as shown in the sketches (Figs. 16 to 18), the shaft being preferably enlarged immediately above the trap (as shown), and continued to, or above, the ground level, as shown in Figs. 17 and 16 respectively. The former arrangement has the disadvantage that any detritus which might pass through the grating would fall into the trap and tend to block it. It is therefore preferable,

* *Liverpool, Manchester, Birmingham, Dublin, and other cities prohibit direct communication with "any sewer or cess-pool, or with any drain constructed or adapted to be used for conveying sewage."*

if the inlet must be at the ground level, to provide a branch off the main shaft, as shown in Fig. 18, and forming the inlet at the end thereof in such a manner that detritus will be intercepted. Alternative inlets of this kind are shown in Figs. 19 and 20.

In the case of a trap fixed in an inspection chamber, a similar inlet may be branched into the chamber, or

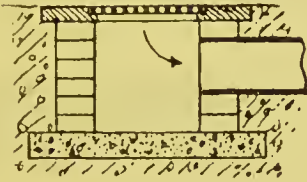


FIG. 19.

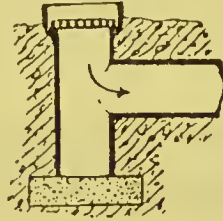


FIG. 20.

the latter covered by a grating under which is fixed a "dirt-box" (see Fig. 59) for the interception of detritus.

The most suitable grating or cover for the ventilation opening, when such takes the form of a pipe, is a wire dome (see Fig. 21). This has small openings whose



FIG. 21.



FIG. 22.

aggregate is larger than the sectional area of the pipe upon which it is fixed, thus more than complying with the by-law. An ordinary grating or other similar air inlet guard may also be used, provided that it complies with the conditions specified in the third paragraph of the by-law. A mica flap valve (Fig. 22) should not be used,

as the flap is liable to jam and thus permanently close the inlet. As there is nothing offensive in a subsoil drain, moreover, there is no necessity for preventing "back-draughts," the reason for which mica non-return valves are often fixed upon sewage drains.

The drain connecting the trap with the sewer, must be constructed of jointed pipes. It must be both air and watertight (the one implying the other), as in the case of a sewage drain. See By-law No. 4 on page 64.

The subsoil drain itself is best constructed of field pipes laid in a solid channel, having a larger diameter

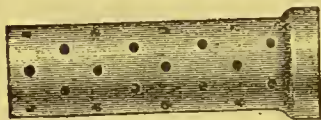


FIG. 23.

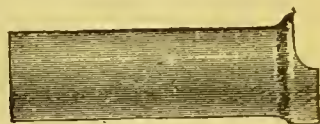


FIG. 24.

than the pipes, and covered with gravel or broken stones (see Fig. 16) to a height of at least two feet. Perforated socketed pipes, (as in Fig. 23), surrounded with gravel; or field pipes with half sockets at the bottom of the drain (Fig. 24), will also be found satisfactory. Field pipes surrounded by soil are liable to choke. The fall or gradient of a subsoil drain should not be less than 1 in 20 for 3in. pipes and 1 in 30 for 4in. pipes. The drain should be branched into the trap at least 3in. above the surface of the water contained by the latter.

Drainage of surface water.

2. A person who shall erect a new building and shall cause any area, forecourt, or paved or unpaved surface within the curtilage of the building to be drained by means of a drain or drains communicating with any sewer shall cause every inlet to such drain or drains to be constructed as a properly-

trapped gully, and shall cause such drain or drains to be otherwise constructed in manner prescribed by the by-laws in that behalf for a drain used for conveying sewage.

NOTE.—This by-law provides that each inlet to a rain-water drain shall be trapped by a *properly trapped* gully, so as to prevent the escape of the air-contents of the drain into the external air at this point. A “properly trapped gully” will be taken to imply a gully having a trap which is sanitary in its shape and construction, and which will ensure the object of the by-law being permanently fulfilled. All properly-trapped gullies are of “syphon” type. The water-seal of the trap which should be taken as the standard, is one having a depth



FIG. 25.



FIG. 26.



FIG. 27.

of not less than $2\frac{1}{2}$ in. The regulation will not apply to any opening provided for ventilating the drain, if such ventilation inlet or outlet is properly treated in the manner required for sewage drains. (See By-law 8 of this Series.) Types of efficient gully traps are shown in Figs. 25, 26 and 27. Unless the drains are provided for rain and surface-water only, it will be well, as far as possible, to arrange sinks, baths and lavatories to discharge into these gully traps in order to assist in maintaining the water-seal during dry weather.

3. Every person who shall erect a new building, and shall provide, in connection with such building,

Rain-water
pipes.

a pipe or channel for the purpose of conveying to any sewer any water that may fall on the roof, shall cause such pipe or channel to discharge in the open air over a properly-trapped gully or into such gully above the level of the water in the trap thereof.

He shall not cause any such pipe or channel to be so constructed as to receive into such pipe or channel any solid or liquid matter from any water-closet, urinal, slop, or other sink, or lavatory.

NOTE.—In accordance with this by-law, each gutter or pipe used for the conveyance of rain-water must be made to discharge over or into a gully trap, as suggested in the appended sketches (Figs. 28 and 29). The pipe or

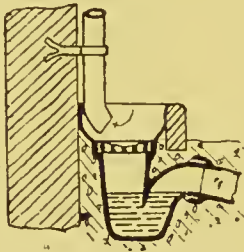


FIG. 28.

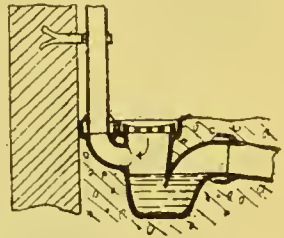


FIG. 29.

gutter must not be allowed to dip into or discharge under the water contained by the trap, as it is imperative that fresh air should circulate right through the rain-water pipes, as indicated by the arrows. The by-law also requires that each of these pipes or gutters be kept distinctly apart from any pipe receiving a discharge other than of rain water, or bath water, and prohibits the practice, hitherto frequent, of allowing rain-water pipes to discharge into, or to ventilate, the soil-pipe or

drains. These requirements are necessary in order to properly and totally disconnect rain-water pipes from the foul portions of the drainage system, and thereby prevent foul air being drawn into the house through windows and other apertures. In connection herewith it may also be pointed out that rain-water pipes are unsuitable for use as drain ventilators, as, apart from other objections, they are rendered useless for the purpose by the downward rush of water at the time when the ventilation of the drains is most necessary.

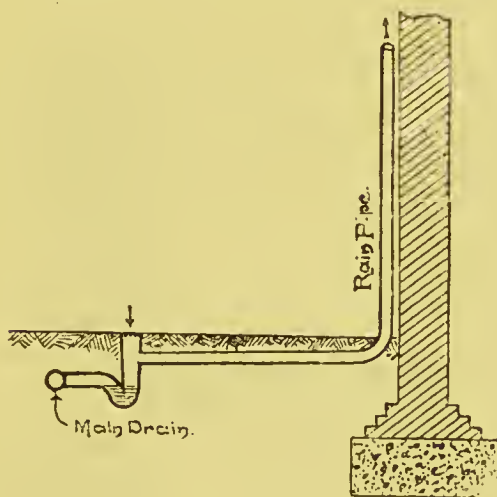


FIG. 30.

Under this by-law, it will also be held unlawful to allow sinks, lavatories, urinals, and similar fittings to discharge into rain-water pipes directly; or indirectly, by discharging them into hopper heads, which also receive rain-water pipes. Although the by-law does not exclude baths, it is desirable that the wastes of these should also be kept apart from rain-water pipes.

The exclusion of the bath waste from the prohibition of the by-law is no doubt due to the assumed fact that bath water usually contains a much smaller proportion of soap, and other organic matter, than water from a lavatory

basin. This, however, is not always the case, and, as the use of baths has become more common, it is found they are frequently put to new uses. Thus, the soiled linen of the house is often soaked in the bath, and, indeed, at times the bath is used for the disinfection of infected articles of clothing. The not infrequent employment by ladies of bran in substitution for soap and of other ingredients, is an additional reason for not permitting the bath waste to discharge into the rain-water pipe.

The object of keeping sinks, lavatories, &c., apart from the rain-water pipes is, of course, to avoid fouling

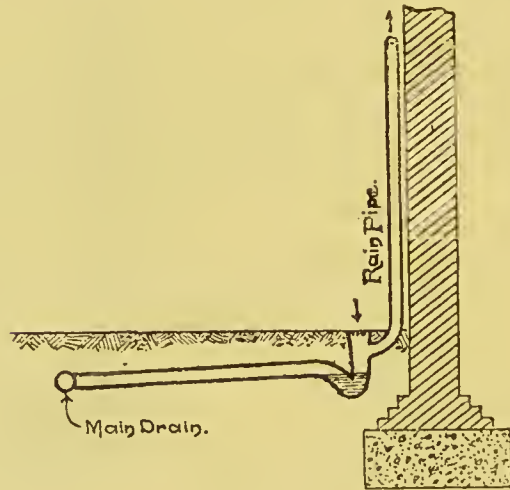


FIG. 31.

the latter. The pipes are generally too large to be self-cleansing by the discharges of the said fittings; they are therefore gradually incrusting with filth, and when decomposing, the emanations from this will be ventilated near the windows, and under the slates of the roof through the joints and the upper ends of the rain-water pipes. The gases will thence be drawn into the house by the warmer air within.

There is no objection to two or more rain-water pipes or channels discharging into or over the same gully

trap. Nor is it unlawful to continue a rain-water pipe underground to a gully trap, as shown in Fig. 30, provided that the underground drain is kept solely for rain-water. This system, in fact, has its advantages, as branch drains will thereby be ventilated. By the arrangement shown in Fig. 31, the air in the branch drain will remain stagnant, unless a separate outlet ventilator is provided. An unventilated branch drain, if of appreciable length, is, of course, contrary to the principles of sanitation.

4. Except in the case of a drain constructed for Materials, &c.,
for drains. the drainage of the subsoil of the site of a building, every person who shall erect a new building shall, in the construction of every drain of such building communicating with a sewer, use good sound pipes formed of glazed stoneware, or of cast iron, or of other equally suitable material.

He shall not construct any such drain so as to pass under any building, except in any case where any other mode of construction may be impracticable.

He shall cause every such drain to be of adequate Size of drain. size, and, if constructed or adapted to be used for conveying sewage, to have an internal diameter of not less than four inches.

He shall also cause every such drain, whether or Drain to be laid
on concrete. not constructed or adapted to be used for conveying sewage, to be laid on a bed of good concrete not less than six inches thick, and projecting on each side of the drain to an extent at least equal to the external

Fall of drain diameter of the drain. He shall also cause such drain to be laid with a suitable fall.

Joints of drain If he shall construct such drain of cast iron jointed with socket joints, he shall cause such joints to be not less than $2\frac{1}{2}$ inches in depth, and to be made with molten lead properly caulked, and he shall also cause the annular space for the lead, in the case of three-inch and four-inch pipes, to be not less than $\frac{1}{4}$ inch in width, and, in the case of five-inch and six-inch pipes, to be not less than $\frac{2}{3}$ inch in width. If such drain be jointed with flange joints, he shall cause such joints to be securely bolted together with some suitable insertion.

If he shall construct such drain of stoneware, or material other than metal, he shall cause such drain to be jointed with socket joints properly put together with cement or other equally suitable material.

Drain to be
water-tight.

He shall cause every such drain (other than a drain constructed for the drainage of the subsoil of the site of a building) to be so constructed as to be water-tight and to be capable of resisting a pressure of at least two feet head of water.

Concrete to be
filled in.

He shall cause good concrete to be filled in so that it shall extend to the full width of the concrete bed already prescribed in this by-law, and so that such drain shall be embedded to the extent of not less than half its diameter.

Thickness and
weight of iron
pipes.

If he shall construct any such drain of cast iron, the thickness and weight of the pipes in proportion to the diameter thereof shall be as follows. (See next page).

Internal diameter. Inches.	Thickness of metal, not less than—	Weight per 9ft. length (including socket and beaded spigot or flanges — the socket not to be less than $\frac{3}{8}$ in. thick), not less than—		
3... ..	$\frac{5}{16}$ of an inch...	...	...	110 lbs.
4... ..	$\frac{3}{8}$ „ ...	...	...	160 „
5... ..	$\frac{3}{4}$ „ ...	...	...	190 „
6... ..	$\frac{3}{4}$ „ ...	...	...	230 „

If he shall construct any such drain of stoneware or material other than metal, the thickness of the pipes, and depths of the sockets, and the annular space for the cement in proportion to the diameter shall be as follows—

Thickness, sockets and joints of stoneware pipes.

Internal diameter, inches.	Thickness of pipe, not less than—	Depth of socket, not less than, inches.	Annular space for the cement, not less than
3... ..	$\frac{1}{2}$ of an inch	...	$\frac{5}{16}$ of an inch
4... ..	$\frac{5}{8}$ „	...	$\frac{5}{16}$ „
5... ..	$\frac{5}{8}$ „	...	$\frac{5}{16}$ „
6... ..	$\frac{5}{8}$ „	...	$\frac{5}{16}$ „
9... ..	$\frac{3}{4}$ „	...	$\frac{7}{16}$ „

Where any such drain (other than a drain constructed for the drainage of the subsoil of the site of a building) passes under a building, he shall cause such part thereof as passes under the building to be laid where practicable in a direct line for the whole distance beneath such building, and to be completely embedded in and covered with good and solid concrete at least six inches thick all round.

Drains under buildings.

Provided that in any case where such drain shall be constructed of iron, he shall not be required to

cover such drain with concrete, but unless it be carried above ground, and also be carried at least at each joint on adequate piers or other sufficient supports, constructed of iron, stone, brick, or cement concrete, it shall be laid on a bed of good concrete in accordance with the requirements of this by-law relating to drains which do not pass under a building.

He shall whenever practicable cause adequate means of access to such drain to be provided at each end of such portion thereof as is beneath such building.

Composition of
concrete.

He shall cause all concrete used in connection with any such drain, whether under a building or not, to be composed of clean gravel, hard brick broken small, or other suitable ballast, well mixed with clean sand and good Portland cement in the proportion of two parts of sand, one part of cement, and six parts of other material.

Inlets to drains
to be trapped.

He shall cause every inlet to every such drain, not being an inlet provided in pursuance of the by-law in that behalf as an opening for the ventilation of such drain, to be properly trapped by an efficient trap so constructed as to be capable of maintaining a sufficient water seal. He shall not construct or fix in or in connection with any such drain, any trap of the kind known as a bell trap, a dip trap, or a D trap.

Protection of
drain beneath
wall.

He shall, in every case where any such drain is laid beneath a wall, cause such drain to be protected at the part beneath the wall by means of an arch,

flagstone, or iron support, which shall not bear on the drain and shall be of sufficient size and strength to prevent any disturbance of or other injury to such drain.

NOTE.—This by-law is intended to secure proper materials and workmanship in drain construction. "Good sound pipes" will be held to mean pipes of good, non-absorbent material, which are reasonably lasting and free from all structural imperfections, such as flaws and unevenness of shape.

The portion of the by-law which refers to the sizes of drains, is necessarily somewhat lax and unsatisfactory, much being left to the individual judgment of Sanitary Authorities and builders, &c. Under this by-law drains unnecessarily large will therefore continue to be used. Speaking generally, there are probably very few houses in the districts to which the by-laws apply in which a 4in. main drain would be of inadequate size. This will be the more readily understood when it is borne in mind that a 4in. drain laid at an inclination of 1 in 40—the proper fall for a 4in. drain—has a discharging capacity of 151·25 gallons per minute, an amount which would be sufficient for the drainage of a house having twenty inhabitants and a superficial area of over 11,000ft., even with an abnormal rainfall. These figures are arrived at by an allowance of $2\frac{1}{2}$ gallons of sewage per hour for each inhabitant—30 gallons per 24 hours, of which one-half is taken as discharged in six hours—and an allowance for a rainfall of over $1\frac{1}{2}$ in. per hour, which is in excess of the usual maximum rainfall. It is but very seldom that the rainfall exceeds 1 in. or $1\frac{1}{4}$ in. per hour; even this is only reached during a very heavy downpour. To provide, or, as is done by certain local authorities, to insist upon the use of 6in. piping for a main drain receiving half-a-dozen 4in. branch drains—from gullies, soil pipes, &c.—which are never likely to run even as much as one-quarter full, is absurd in the extreme.

A section through a bed of concrete, which will comply with the fourth paragraph of the by-law, is shown in Fig. 32.* In laying the concrete, it is necessary that wooden moulds be inserted at the points at which the sockets of the drain pipes occur, or that depressions be

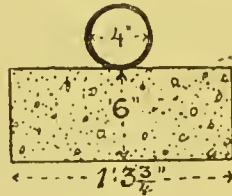


FIG. 32.

otherwise formed. This is necessary to ensure that the pipes will rest upon their barrels—as against their sockets—and also in order that suitable hand-holes (see Fig. 35) be formed for the convenience of joint making and testing. On completion, should the drains be constructed

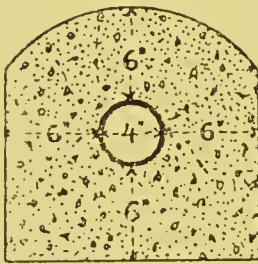


FIG. 33.

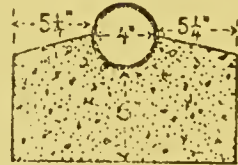


FIG. 34.

of stoneware or material other than iron, the pipes must (in accordance with paragraphs 8 and 11 of the by-law) be embedded and covered with concrete, as shown in Fig. 33, when passing under buildings; and embedded

* In *Manchester* concrete foundations are only required "where necessary." *Liverpool* permits "well-tempered clay puddle" as an alternative. It is desirable that proper concrete foundations be used *in all cases*.

in concrete, as shown in Fig. 34, when laid outside the buildings. The illustrations show 4in. drains in each case, the concrete shown being of the minimum permissible dimensions. Iron drains need not be covered over with concrete when passing under buildings, but must,



FIG. 35.

when laid underground, be laid upon concrete foundations and embedded in concrete in the manner required for stoneware drains outside the buildings and illustrated in Fig. 34.* Whether the drains be inside or outside the house, iron drains, if carried above

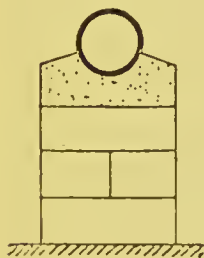


FIG. 36.

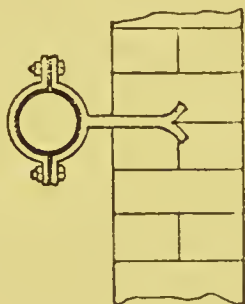


FIG. 37.

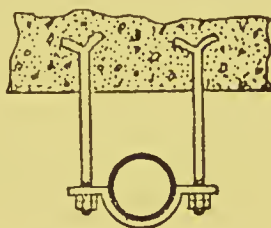


FIG. 38.

ground must comply with the twelfth paragraph of the by-law by being supported at each joint. Various means of support are suggested in Figs. 36, 37, and 38, which respectively illustrate a drain laid on piers built on the

* *Birmingham, Manchester, Liverpool, and Belfast* require all drains passing under buildings to be encased in concrete.

floor, a drain suspended from a wall, and one suspended from the ceiling.

"Good concrete," as specified in paragraphs 4, 8, and 11, will be held to mean concrete of clean and efficient materials, of the nature, and mixed in the proportions, stated in paragraph 14. The proportion of cement to sand and ballast must not be less than stated, but may be increased with advantage.

The fourth paragraph also requires drains to be laid with suitable falls. The most suitable fall for a drain is one which will ensure for the sewage a velocity of 4·5ft. per second for drains running full or half-full, and 3·0ft. per second for drains running quarter-full. These falls may be obtained very approximately by Maguire's so-called "decimal rule," which consists of multiplying the diameter of the drain, in inches, by ten. Thus, 4in. drains require a fall of 1 in 40; 5in. drains, a fall of 1 in 50; and 6in. drains, a fall of 1 in 60.

The fifth clause of the by-law requires no explanation, but it may be pointed out that well-jointed socketed iron pipes are much to be preferred to flanged pipes, as the "suitable insertion" required for the joints of the latter (consisting usually of india-rubber or asbestos) is very liable to deteriorate with age, or through contact with moisture, however suitable it may be when the drains are first laid. The joints of the socketed pipes should be made wholly of lead, as the gaskin frequently used is very apt to decompose and disappear, leaving a hollow at each joint for the accumulation of sewage. Whilst it lasts, it will also tend to harbour bacteria, which, in the case of pathogenic bacteria, is a serious matter, as the germs may multiply enormously in the meshes of the hemp.

The same objection applies to any organic substance used in connection with the stoneware pipe joints, which Clause 6 refers to. The hemp or gasket frequently made use of in Portland cement joints soon disappears through decomposition. The joints should therefore be made wholly of cement, care being taken to remove any cement which may enter the drain in the process of

jointing. Other suitable jointing material, than cement, for stoneware pipe joints, is the bituminous material made use of in "Stanford" and similar joints. This material is, however, sometimes liable to be dissolved by the action of certain gases and acids present in sewage, and should not, therefore, be entirely relied upon.

The ninth paragraph gives the *minimum* thickness of metal and weight of iron pipes, which will be permitted for underground drains; whilst the tenth gives a similar table of thickness and dimensions required for stoneware pipes. Stronger piping is, of course, permitted and preferable.

The seventh paragraph requires all drains, other than subsoil drains, to be water-tight and capable of withstanding an internal pressure equal at least to that given by a column of water two feet high—that is, about (rather less than) one pound per square inch. This is a comparatively mild test, and it will be well for the builder's or owner's—not to mention the occupier's—own satisfaction, to apply one more severe. Sound and efficient drainage, after all, has for its object the preservation of health, and should not be provided merely for the satisfaction of an Authority, or in compliance with a by-law which can but make a minimum requirement. Thorough work in the first place will, in the end, also prove cheapest for the owner's pocket. Well-laid stoneware drains of good quality should be able to withstand a pressure of from 4 lb. to 5 lb. per square inch, but it is not desirable to subject them to a greater pressure.

Iron drains are capable of withstanding a pressure of from 50 lb. to 100 lb. when properly jointed, but it is generally sufficient to test them up to a pressure of from 5 lb. to 10 lb. The drains should be tested and made thoroughly tight in themselves before being covered with concrete, and re-tested when embedded in concrete and again on completion of the works after all earth has been filled in. It will be noted that by prescribing the minimum pressure which a drain must

be able to withstand, no room is left for differences of opinions or inefficient tests. Moreover, as the by-law names a *minimum* and not an *average* pressure, the pressure must be of the prescribed severity at the head as well as at other parts of the drain. Hence, if the drains are tested by water, the latter must be arranged to stand at a level of at least two feet above the highest point of the drains. As, owing to the wording of the clause, it would appear at first sight that the by-law requires drains to be tested by water, it may be well to point out that the pressure to be withstood, and not the means by which drains are to be tested, is prescribed. Hence, not only the hydraulic but also the pneumatic test may be employed. The latter has its advantages over the water test, in that even in a steep drain the pressure applied will be uniformly severe on all portions, whilst in the case of the water test the pressure would range from two feet at the highest point to whatever the head of water might be at the outlet of the drain.

This latter in a steep drain might prove unnecessarily or undesirably severe. The water, or hydraulic, test is applied by plugging the outlet end of the drains with a suitable stopper, and filling the piping with water up to the level required, all intermediate openings in the drainage system being also plugged. The water should then be allowed to remain in the drains for the space of at least half an hour. If during this time the water level remains stationary, the drains may be passed as sound. If, on the other hand, it falls, then a leakage exists. The point or points of leakage will be apparent, in uncovered drains, by the oozing or flowing of water through the defective portions. All defects must be made good and the drains re-tested until the whole is proved to be perfectly water-tight. The pneumatic test is applied by plugging all openings on the drainage system, and pumping air into it until the desired pressure has been obtained. This in modern apparatus is registered upon a gauge, which will remain steady if the drains are sound. Should there be leakage, the

indicator will, of course, fall. A safety valve on the machine may be set to liberate all excessive pressure.*

Each inlet to the drains, other than openings used in connection with the ventilation of the drainage system, must, in accordance with the fifteenth clause, be provided with an efficient trap, such as described in the

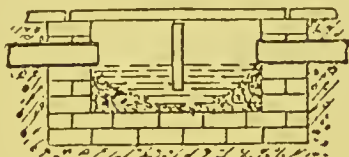


FIG. 39.

annotations to the by-law relating to surface-water drains (By-law No. 2). The traps which are specially named as unlawful are the dip trap, the bell trap, and the D trap shown in Figs. 39, 40, and 41 respectively. These should, however, only be regarded as *types* of bad traps. Similar insanitary traps, such as the Lip trap,

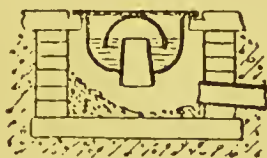


FIG. 40.

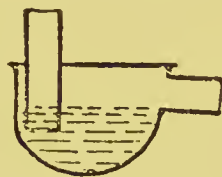


FIG. 41.

shown in Fig. 42, and the cesspool trap, shown in Fig. 43, are equally inadmissible. The first-named of the two latter would be embraced by the term "dip trap," which will be held to apply to any trap formed by the dip of a projection, whatever the position of the latter.

* For further details of the above and other tests, and particulars of apparatus made use of in connection with drain testings, see "Modern Drainage Inspection and Sanitary Surveys." Price 2s. 6d. net. London: The Sanitary Publishing Co., Ltd.

The sixteenth and last clause of the by-law provides that a drain passing through or beneath a wall must be protected against breakage by a relieving arch or girder, &c., as specified in the by-law and suggested in the sketches Figs. 44 and 45.



FIG. 42.



FIG. 43.

The paragraph relating to drains under buildings requires also that all drains passing under a house should, whenever practicable, be provided with means of access at each end. This is best accomplished by build-

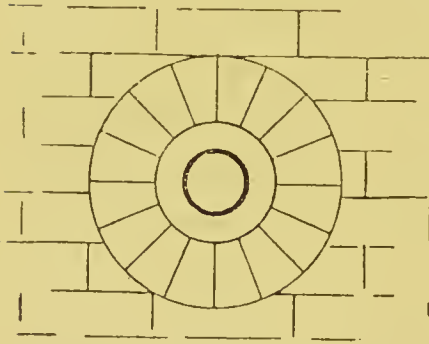


FIG. 44.

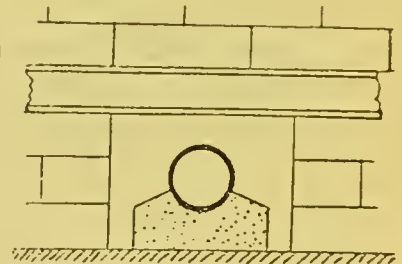


FIG. 45.

ing an inspection-chamber at each end of the drain, immediately outside the house. These chambers should, with exception of the disconnecting trap, comply with the recommendations made in the Notes to By-laws Nos. 5 and 6. Should there not be room for an inspection-chamber outside the house, it may be built within,

provided that proper precautions are taken to preclude the possibility of drain-air gaining an entrance to the house.

5. Every person who shall erect a new building shall provide in every main drain or other drain of such building which may immediately communicate with any sewer, a suitable and efficient intercepting trap at a point as distant as may be practicable from such building, and as near as may be practicable to the point at which such drain may be connected with the sewer. Drains to be trapped from sewer.

He shall, except in cases where the means of access to be provided in compliance with the preceding by-law shall give adequate means of access to such trap, provide a separate manhole or other separate means of access to such trap, for the purpose of cleansing it. Access to trap.

NOTE.—The most suitable position for fixing an intercepting trap is the point at which the drain leaves the premises. This, in the case of town houses, is, as a rule, either in the front area or in a cellar under the footway. In suburban dwellings, the most suitable position for the trap is generally in the front garden where the drain leaves the curtilage.

The chief characteristics of a suitable and efficient trap are:—An ability to cleanse itself, freedom from liability to get out of order, and the provision of an efficient “seal,” with a minimum quantity of water. In order to ensure these conditions, the trap must be free from all mechanism, must be of uniform shape, and as small as possible, and in addition should have a clear drop of 3in. from the invert of the

inlet drain to the surface of the water in the trap. This drop is necessary to form a cascade with which to drive out any solids which may accumulate in the trap. The trap should also be provided with a foot for stability. Good forms of intercepting traps are shown in Figs. 46

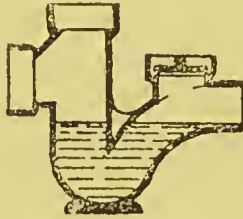


FIG. 46.

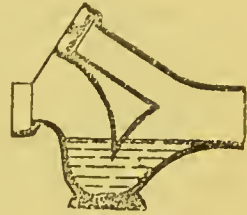


FIG. 47.

and 47, whilst Figs. 48 and 49 illustrate insanitary traps.

It is desirable that the trap should be fixed in an inspection chamber sufficiently large to allow a man to work therein with drain rods, either by leaning into



FIG. 48.

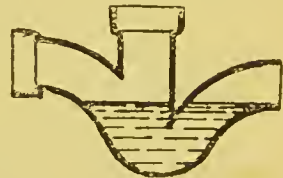


FIG. 49.

it or by entering it bodily. The most convenient sizes for an inspection chamber are:—

For manholes 1ft. 6in. or less in depth	2ft. 0in. × 1ft. 6in.
For manholes between 1ft. 6in. and 2ft. 6in. in depth	2ft. 6in. × 2ft. 0in.
For manholes above 2ft. 6in. in depth	3ft. 6in. × 2ft. 6in.

When over 7ft. 6in. in depth, the upper portion of the manhole may be contracted in size by constructing an arch at a height of 5ft. above the invert of the drain,

DETAILS OF MANHOLES.

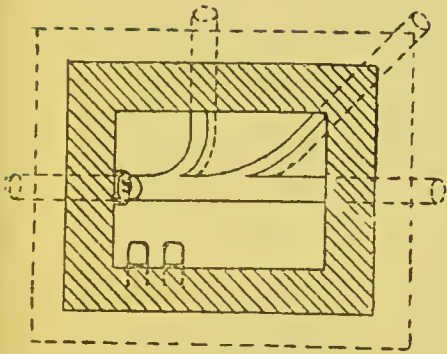


FIG. 50.—PLAN.

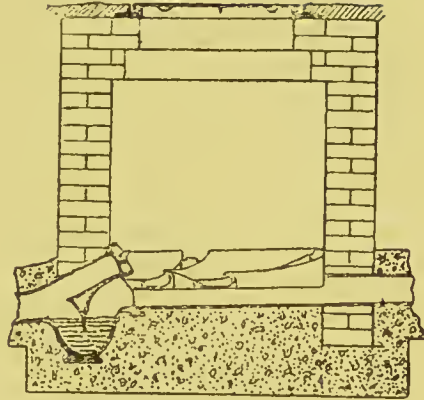


FIG. 51.—LONGITUDINAL SECTION.

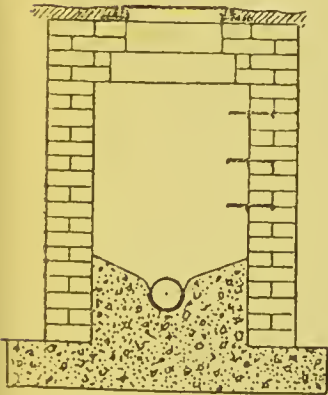


FIG. 52.—CROSS SECTION.

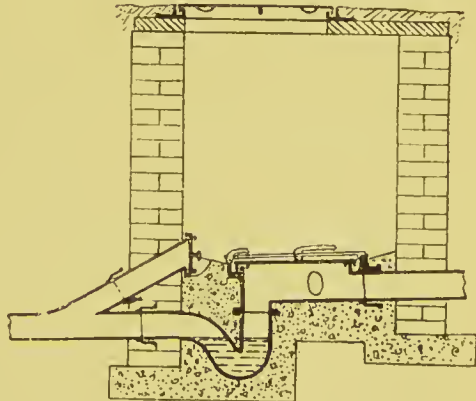
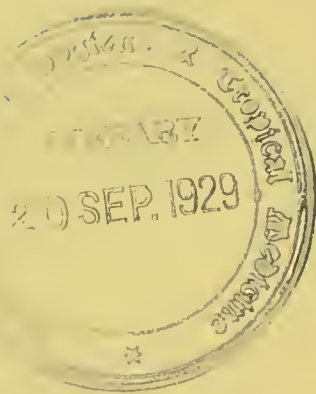


FIG. 53.



a shaft 2ft. 6in. \times 2ft., or 2ft. in diameter in the interior, being carried up to the level of the ground. The annexed sketches (Figs. 50, 51, and 52) show the details of construction of an ordinary manhole, through which the main and branch drains are carried in the form of open channels. An alternative to these channels, which has the advantage of confining drain air to a small proportion of the manhole and of facilitating thorough ventilation, is shown in Fig. 53. In this case the bottom of the chamber is formed by an access pipe set in concrete—as shown—and provided with an air-tight removable cover. The manhole should be built upon Portland cement concrete foundations, and should be constructed of glazed bricks set in cement or of ordinary



FIG. 54.



FIG. 55.

impervious bricks. In the case of manholes with open channels, the latter must be rendered in cement or covered by sheets of thick plate glass. Drains discharging into manholes should never be branched into the manholes directly opposite each other, as in that case they are liable to discharge their contents into each other. The right and wrong way of branching drains into manholes are shown in Figs. 54 and 55 respectively. A cleansing arm, giving access to the drain beyond the trap, may, with advantage, be introduced at the outlet of the trap, as shown in the sketches (Figs. 51 and 53).

It should be borne in mind that the object of fixing a trap is to aërially disconnect or isolate the drain from the sewer or from the drain of another house. In providing a manhole it is therefore necessary that it should be built round *one trap only*. Should two traps on two

adjoining drains be fixed in the same manhole (as in Fig. 56), the two drains will be in direct aërial commu-

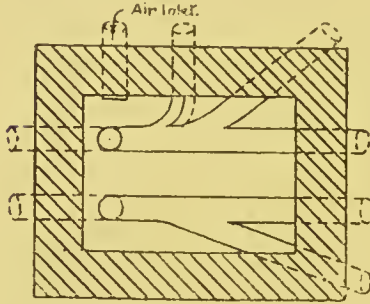


FIG. 56.

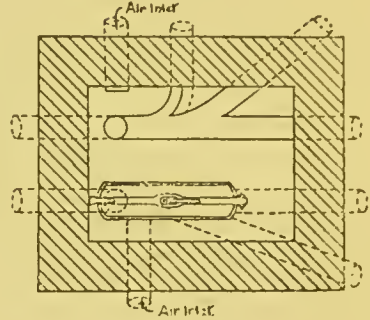


FIG. 57.

nication with each other, unless at least one of the drains is provided with an access chamber which isolates the drain (see Figs. 57 and 53).

6. A person erecting a new building shall cause every means of access provided in compliance with any of the foregoing provisions of these by-laws to be constructed so as to be water-tight up to the level of the adjoining ground-surface or roadway and to be fitted with a suitable manhole-cover, and, if placed within a building, to be fitted with an air-tight cover.

NOTE.—As has already been said in the note to the foregoing by-law, the interior surfaces of a manhole with open drains should be rendered in cement or otherwise made water-tight. This is necessary in order that sewage should not be absorbed by, or pass through the brickwork of which the manhole is constructed. The by-law requires that the manhole shall be water-tight.

up to the ground level, as it is possible for the sewage to reach all parts thereof in the event of a stoppage in the trap or outfall drain.

The most suitable cover for a manhole is one which is strong enough to withstand such traffic as may pass over it, and which is yet sufficiently light to be readily removed.

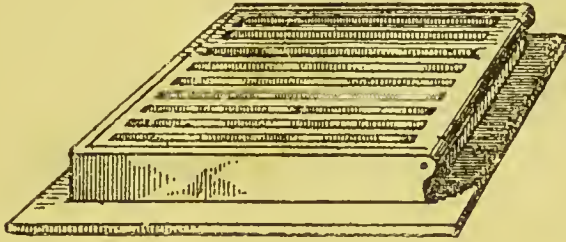


FIG. 58.

Such manhole covers are made of iron. Stone covers are not suitable on account of their comparatively great weight, and the difficulty of making them at once air-tight and easily removable, where air-tight covers are desired. Although the by-law only insists upon air-tight covers for manholes built within buildings, it is well to

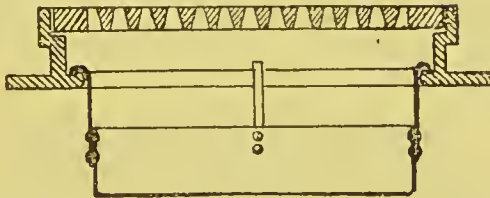


FIG. 59.

provide air-tight covers on all manholes unless it is desired that they should also act as air inlets to the drains. In that case, and provided that the manholes are at a safe distance from the house (this is generally impossible in town houses), the covers may take the form of gratings (see Fig. 58) provided with dirt boxes (as shown in Fig. 59) for intercepting detritus. In all other

cases the covers should be similar to the one shown in Figs. 60 and 61, which is provided with a U-shaped groove into

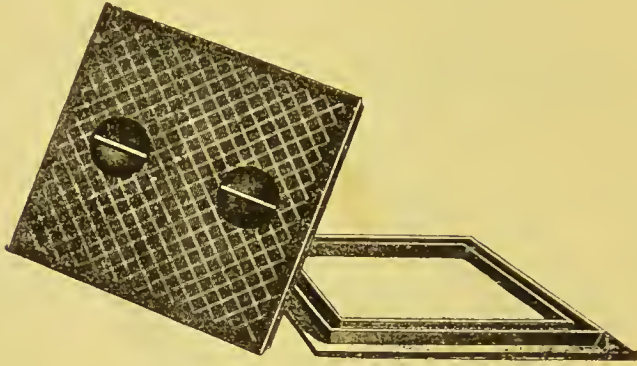


FIG. 60.

which the cover is fitted. This groove may be filled with tallow, oil, water, or india rubber packing, to prevent the

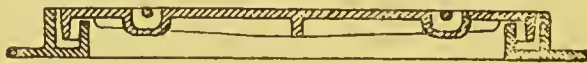


FIG. 61.

passage of drain air. As an additional safeguard in the case of manholes within buildings, the bottoms of the

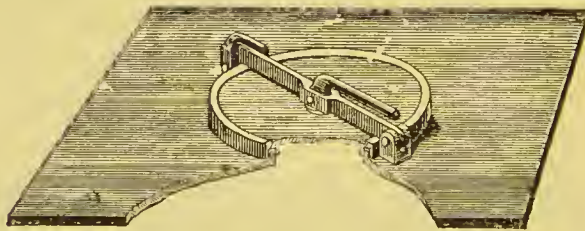


FIG. 62.

chambers should be formed by air-tight access pipes as in Fig. 53. As an alternative, an air-tight cover, such

as shown in Fig. 62, may be built into the manhole immediately above the channels.

7. A person who shall erect a new building shall not construct the several drains of such building communicating with a sewer in such a manner as to form in such drains any right-angled junction, either vertical or horizontal. He shall cause every such branch drain or tributary drain to join another drain obliquely in the direction of the flow of such drain and as near as practicable to the invert thereof.

No right-angled junctions.

NOTE.—The evils of right-angled junctions are :—(1) They tend to accumulate deposits and to cause stoppage by accumulations or by the jamming of substances or articles which, by rights, should not enter the drains; and (2) they break the velocity of the flow within the

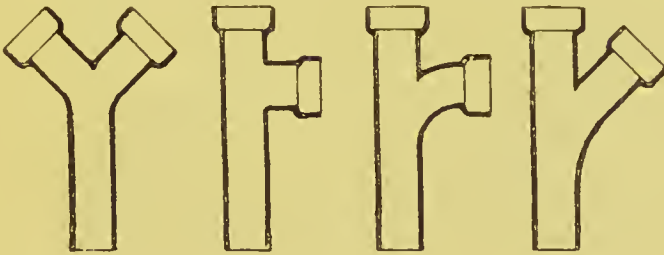


FIG. 63. FIG. 64. FIG. 65. FIG. 66.

drains. Junctions should therefore always be curved in the direction of the flow in the drains. The change of direction in the drains should, moreover, be as gradual as possible. Fig. 64 shows the prohibited junction, whilst Figs. 65 and 66 show good forms of junctions. The one shown in Fig. 66 is preferable to that shown in

Fig. 65, on account of the more gradual change. Y junctions (Fig. 63) should also be avoided, as the branches are liable to discharge their contents into each other, and thus invite stoppages. To minimise the risk of stoppage, branches are required to join the main drains as near as practicable to the inverts thereof—that is, they must join the main drains at the sides, as shown in Fig. 67,



FIG. 67.



FIG. 68.

and not on their crowns, as shown in Fig. 68. Bends in drains are practically also junctions, and should also be very gradual in their change of direction. A good and a bad form of bend are shown in Figs. 69 and 70 respectively. Although not compulsory under the by-laws, it is always advisable and advantageous (being least costly in the long run) to group bends and junctions together,

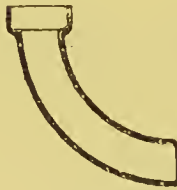


FIG. 69.



FIG. 70.

and to provide them with means of access by building manholes round them. If this is done, the main and branch drains are at all times accessible for cleansing purposes, whilst obstructions may be removed without the necessity of breaking the drains. The manholes should in all respects comply with the recommendations made in the notes to By-laws 5 and 6.

8. Every person who shall erect a new building shall, for the purpose of securing efficient ventilation of the drains of such building communicating with a sewer, comply with the following requirements:—

Ventilation of drains.

(i.) He shall provide at least two untrapped openings to the drains, and in the provision of such openings he shall adopt such of the arrangements hereinafter specified as the circumstances of the case may render the more suitable and effectual.

(a) One opening being above and near the level of the surface of the ground adjoining such opening, shall communicate with the drains by means of a suitable pipe, shaft, or chamber, and shall be situated as near as may be practicable to the trap which, in pursuance of the by-law in that behalf, shall be provided between the main drain or other drain of the building and the sewer. The point at which such opening communicates with the drain shall also in every case be situated on that side of the trap which is the nearer to the building.

Alternative arrangements.

The second opening shall be obtained by carrying up from a point in the drains, as far distant as may be practicable from the point at which the first-mentioned opening shall be situated, a pipe or shaft, vertically, to such a height and in such a

position as to afford by means of the open end of such pipe or shaft a safe outlet for foul air.

(b) In every case where the foregoing arrangement of the openings to the drains may be impracticable or undesirable, there may be substituted the arrangement hereinafter prescribed.

One opening shall be obtained by carrying up from a point, as near as may be practicable to the trap, which, in pursuance of the by-law in that behalf, shall be provided between the main drain or other drain of the building and the sewer, a pipe or shaft, vertically, to such a height and in such a position as to afford, by means of the open end of such pipe, a safe outlet for foul air. The point at which such opening communicates with the drain shall also in every case be situated on that side of the trap which is the nearer to the building.

The second opening, being at a point in the drains as far distant as may be practicable from the point at which such last-mentioned pipe or shaft shall be carried up, shall be above and near the level of the surface of the ground adjoining such opening, and shall communicate with the drains by means of a suitable pipe or shaft.

(c) If in any case neither of the two preceding arrangements are desirable, then both the first and second openings may be obtained by carrying up from the points referred to in the previous subsection suitable vertical pipes or shafts to such heights and in such positions that when either acts as an inlet the other may be a safe outlet for foul air.

(ii.) He shall cause every opening provided in accordance with any of the arrangements hereinbefore specified to be furnished with a suitable grating or other suitable cover for the purpose of preventing any obstruction in or injury to any pipe or drain by the introduction of any substance through any such opening. He shall, in every case, cause such grating or cover to be so constructed and fitted as to secure the free passage of air through such grating or cover by means of a sufficient number of apertures, of which the aggregate extent shall not be less than the sectional area of the pipe or drain to which such grating or cover may be fitted. *Gratings or cover to openings.*

(iii.) He shall not, except where unavoidable, cause any bend or angle to be made in any pipe or shaft used in connection with any of the arrangements hereinbefore specified. *No bends or angles in pipes.*

(iv.) He shall cause every pipe or shaft which may be used in connection with any of the arrangements hereinbefore specified to have *Size of pipes.*

an internal diameter of not less than four inches.

*Construction,
material, and
weight of pipes.*

(v.) He shall cause every pipe or shaft used in connection with any of the arrangements hereinbefore specified to be constructed in the same manner and of the same material and weight as if such pipe or shaft were a soil pipe.

*Use of soil pipes
as ventilating
pipes.*

(vi.) Provided always, that for the purpose of any of the arrangements hereinbefore specified the soil pipe of any water closet, or the waste pipe of any slop sink constructed or adapted to be used for receiving any solid or liquid excremental filth, in every case where the situation, sectional area, height, and mode of construction of such soil pipe or such waste pipe shall be in accordance with the requirements applicable to the pipe or shaft to be carried up from the drains, shall be deemed to provide the necessary opening for ventilation which would otherwise be obtained by means of such last-mentioned pipe or shaft.

Provided also that any such soil pipe or waste pipe shall, where such soil pipe or waste pipe shall have an internal diameter of not less than three and a-half inches, and shall in all other respects comply with the requirements as to the position, height, and mode of construction of the pipe or shaft to be provided for the ventilation of

any drain, be deemed to provide adequate ventilation for any drain having an internal diameter of not more than four inches.

NOTE.—The objects of ventilating the drains are :—

(1) To prevent the air contents of the drain being forced by pressure into the house ; (2) To diffuse and dispose of, at a safe point, any sewer air which may gain admittance to the house drain through the trap which by-law No. 5 requires to be fixed on the outlet of the drain ; (3) To oxidise the sewage passing through the drains, and so retard its decomposition until it has been removed ; and (4) To oxidise the interior of the drainage system, and to dilute and diffuse any noxious gases which may be formed therein.

(i.) To obtain ventilation, two openings at the least are necessary, for, unless there be means of ingress as well as of egress, there will be no air current, and the drain will remain stagnant. With two openings there will, on the other hand, be a continuous current of fresh air, the motive power being supplied by nature. This is due, at times, to the difference in temperature between the air in the drain and that of the exterior. When the temperature of the air within is higher than that without, the drain air expands, and, by reason of its increase in volume, a portion is discharged. An inequality in the weight of the air within the drain, and that of the exterior, is thus established ; and, as the latter is the heavier, this will enter the drain through the lowest opening, in accordance with the law of gravitation. This action is further supported by the large quantity of watery vapour which is carried by the air within the drain, which increases the tendency to rise so long as its humidity is greater than that of the external air. The action of wind is also of great assistance in inducing an upward current in ventilation shafts, by reason of the aspirating effect produced by a current of air passing across another at right angles. These and similar conditions tend to produce an air-

current in drains, but there is reason to think that other and perhaps more important factors are also at work. The theory of drain ventilation is, in fact, still far from being exact, although the practice would appear to be not far from correct.

From what has been said, it will be obvious—and the theory is confirmed by what actually takes place—that it is not only necessary to have two openings in the drainage system for its thorough ventilation, but that there must also be an appreciable difference in level between the two openings, in order that a current of air may be induced by natural means. The inlet ventilator must

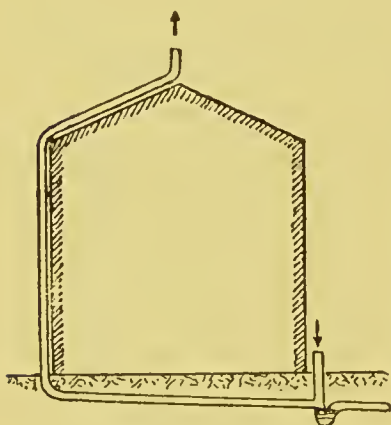


FIG. 71.

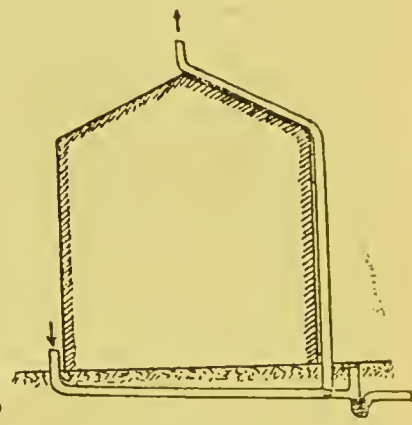


FIG. 72.

be situated at the lowest possible level, and the outlet at the highest level obtainable. The latter opening must also be in as exposed a position as possible, in order to obtain all possible advantage from the prevailing winds.

Of the three different methods of ventilation which are required by sub-sections *a*, *b*, and *c* (and which are illustrated in Figs. 71, 72, and 73 respectively), the second is, perhaps, preferable, as the air current in the drain will travel in the same direction as the flow of sewage—some advantage being obtained from the latter in inducing and propelling the air-current. The method required by

sub-section (a) is, however, the one which is generally most convenient in town houses, where the soil pipe—which is usually utilised as the outlet shaft—is more often than not at the back of the house; that is, at or near the point furthest away from the disconnecting trap. Method (c), although permitted by the by-law, cannot be recommended as efficient, for the reason that it is open to the serious objection that there is a tendency to equilibrium and stagnation of gases in the drains.* This is caused by the collection of the heavier gases, such as carbonic acid gas, at the lowest points of the drains, thereby virtually causing the

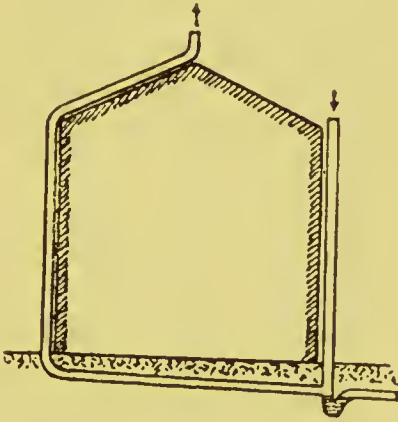


FIG. 73.

formation of an air trap in the drain. It will also be noticed that the by-law places this method last, and permits it *only* in case neither of the two preceding methods are desirable. Where the system is adopted, some attempt (such as that shown in Fig. 73) should be made at an inequality of height in the pipes.

The opening nearest the trap must, of course, as stated in the by-law, be provided on the drain side of the latter. Were it to be branched out from the sewer side of the

* This alternative (c) appears to be peculiar to London. The by-laws of other cities do not permit it.

trap, it would serve to ventilate the sewer and not the drain.

As regards the opening of the air-inlet shaft, it will be noticed that the by-law makes use of the words "above and near the level of the surface of the ground adjoining." The word "above" has doubtless been made use of in order to protect the opening against being covered over by leaves or other detritus, and in order to prevent the shaft from being choked by earth or sweepings.

The outlet ventilation shaft must terminate in such a position as to provide a safe outlet for foul air. That is, it must terminate well out of the way of all windows and chimneys, and not too near the roof, as foul air may enter the house through fissures under the slates or by being drawn or blown down chimneys.*

Should the drain consist of two or more long branches, each branch must be ventilated by the provision of additional ventilation pipes, as suggested in Figs. 74 and 78.

(ii.) As pointed out in the annotation to the first by-law, the most suitable cover for a ventilation pipe is a domical wire guard (see Fig. 21). This is, apart from being the most efficient, generally also the cheapest. It should be used for the outlet ventilation pipe in all cases. As the outlet of the pipe is usually difficult to reach, and often out of sight, it is very essential to provide it with a reliable guard which requires no attention and near inspection to ascertain that it is free of blockage. Cowls, whose alleged object is to strengthen the air current, should be studiously avoided, as they frequently do nothing more than exclude rain, and very often are utilised by birds as a cover for their nests, which, of course, put a decided stop to ventilation. This objection also applies to most "ornamental" terminals for ventilation pipes.

The air-inlet pipe should be treated in a manner similar to that advocated in the annotation to By-law I.,

* In *Dublin* the outlet shaft must be at least 10ft. high.

DRAINAGE PLAN.

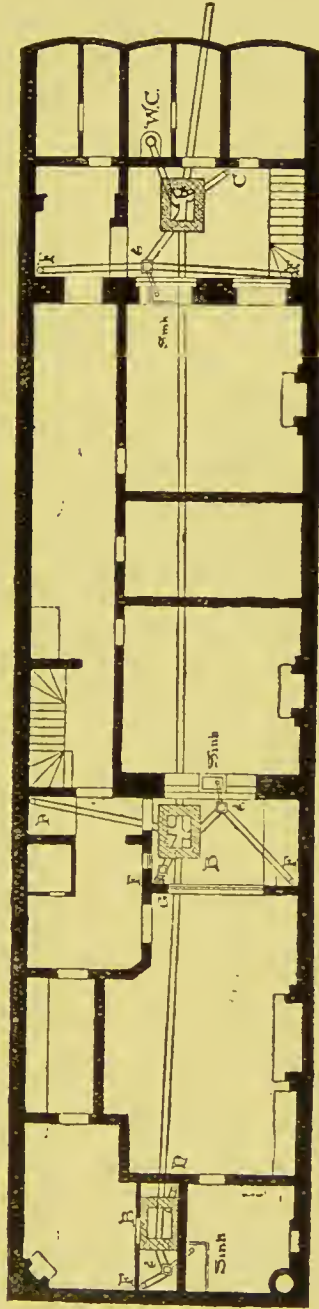


FIG. 74.

REFERENCE.—A, Disconnecting Chamber; B, Inspection Chamber; C, Fresh Air Inlet; D, Soil and Ventilation Pipe;
E, Surface Trap; F, Rain-water Pipe; G, Waste Pipe; H, Outlet Ventilation Pipe.



for the subsoil-drain ventilator. Mica flap valves (also termed mica non-return valves), such as illustrated in Fig. 22, should preferably not be used, as they are liable to become defective, or are prevented from closing or opening by the accumulation of dust and other substances which are blown into them. All that is really necessary is to place the openings at some distance from doors, windows, and other positions where a "back-draught" might prove unpleasant. Danger there is none through such a back-current into a suitable place, drain-air containing the gases of sewage in a much diluted condition, when the drain is well-constructed and properly flushed and ventilated.

(iii.) Bends or angles—the latter being the worst—must, if possible, be avoided in ventilation pipes; be they inlets or outlets. By experiment, it has been found that a right angle will diminish the air-current by as much as one-half, so that a ventilation pipe with one of these angles will be only half as efficient as a straight pipe; whilst one with two angles will only have a quarter the ventilating power of a straight pipe of similar length and diameter. If bends are necessary, therefore, they should be as obtuse as possible. When a sharp bend is essential, it will be well to increase the sectional area of the pipe at that point. As the discharging capacity of pipes varies as the square root of the fifth power of the diameter, or as $d^{2.5}$, the enlargement (properly tapered at both ends) should be in that ratio. That is :

Diameter of ventilation pipe. Inches.								Diameter of bend (roughly). Inches.
2	..	..	..	..	..	..	..	$2\frac{3}{4}$
$2\frac{1}{2}$	..	..	..	..	..	..	..	$3\frac{1}{4}$
3	..	..	..	..	..	..	..	4
$3\frac{1}{2}$	..	..	..	..	..	..	..	$4\frac{1}{2}$
4	...	..	..	..	..	..	..	$5\frac{1}{4}$
$4\frac{1}{2}$	..	..	..	..	..	..	..	6
5	..	..	..	..	..	..	..	$6\frac{1}{2}$
6	..	..	..	..	..	..	..	$7\frac{3}{4}$

(iv.) A four-inch outlet ventilation shaft will in most

cases be found sufficiently large to ventilate an underground drain in the districts to which these by-laws apply, more especially since in a small drainage system the main drain will usually be of a similar diameter, whilst in the case of more extensive systems, the branch drains upon which the shafts are fixed will also be four inches in diameter.* As regards the air-inlet shaft, it should, however, be noted that it will frequently be desirable to provide one of larger diameter than four inches. Thus, where the inlet shaft is connected to an intercepting chamber receiving, say, two four-inch drains provided with outlet shafts, it will be necessary



FIG. 75.

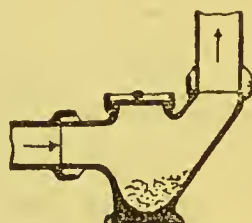


FIG. 76.

to provide an inlet shaft six inches in diameter in order to supply sufficient air for both drains.

In connection with this section of the by-law under consideration, it may be noted that, under Clause (vi.), a $3\frac{1}{2}$ -inch soil pipe will be deemed to provide sufficient ventilation for a drain not exceeding four inches in diameter.†

(v.) This clause relates to the materials and general construction of ventilation pipes, which must in all respects comply with the requirements regarding soil pipes. Details of these will be found in the eleventh

* The sectional area for ventilation pipes (inlet or outlet) prescribed in *Manchester* is "not less than one-half" that of the drains with which they communicate, provided that each shaft is not less than 4in. in diameter.

† A soil pipe of this diameter would, for the purpose of ventilation, be insufficient in *Liverpool*, *Manchester*, *Birmingham*, *Dublin*, and other cities.

By-law on page 109. It may, however, be here stated that it is invariably desirable to construct ventilation pipes of lead in preference to iron. Iron soil pipes in which there is a flow of sewage are soon coated in the interior with a slime-like film, which being constantly kept moist, effectually protects the iron against rust. Even should scales of rust be formed and fall into the pipe, they will be removed by the next flush of the closets. No such considerations apply to ventilation pipes, and it is found that, even when properly coated by some protective solution, they sooner or later corrode, and thereby deteriorate, and become blocked with rust.

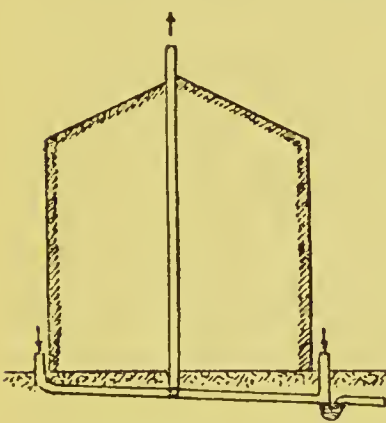


FIG. 77.

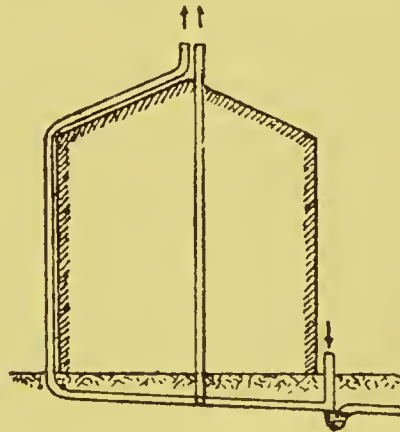


FIG. 78.

The last-named may, however, to a great extent be guarded against by the provision of efficient and suitable rust chambers (Figs. 75 and 76) at all bends. The utilisation of lead for ventilation pipes may advantageously be carried so far even as to construct of lead all such portions of soil pipes as are provided purely for ventilation.

(vi.) It may be pointed out that this clause, under which a soil pipe (or a waste pipe from a slop sink—which is practically a soil pipe), may be deemed to provide the necessary opening for ventilation which would otherwise be obtained by means of a special

ventilation pipe, stipulates that the situation, area, height, and general construction must be in accordance with the requirements regarding a ventilation pipe other than a soil pipe. A soil pipe cannot therefore be deemed to take the place of a specially constructed ventilation shaft, unless it is situated at one of the extremities of the drain. The ventilation of a drain by means of two air inlets and a soil pipe in the centre of the drain (as in Fig. 77) is therefore illegal, even though it be efficient. Should the soil pipe be in the centre of the drain, an additional up-cast shaft must be constructed as in Fig. 78. A soil pipe having a diameter of $3\frac{1}{2}$ inches will, however, be deemed sufficiently large to ventilate any drain not exceeding four inches in diameter.

No inlets to
drains within
buildings.

9. A person who shall erect a new building shall not construct any drain of such building communicating with a sewer in such a manner that there shall be within such building any inlet to such drain except such inlet as may be necessary from the apparatus of any water closet, slop sink or urinal.

NOTE.—The objects of this by-law are to render it, as far as possible, unnecessary to carry a drain under a building, and to prohibit the reprehensible practice of draining wash and other cellars and larders by means of gully traps connected to the sewage drains direct. These traps are liable to lose their water seal through evaporation, and, should this occur, a free passage into the house would be open to drain air. If cellars or rooms have to be drained, it should be done by means of surface channels leading into an external area or over a surface trap *outside* the house. In exceptional circumstances a gully trap or traps and drain may be provided if led to discharge into a surface trap outside, as shown in Fig. 79.

The drain must, of course, discharge into the trap *above* the water level in the latter. As a general rule, and more particularly in the case of cellars and other apart-

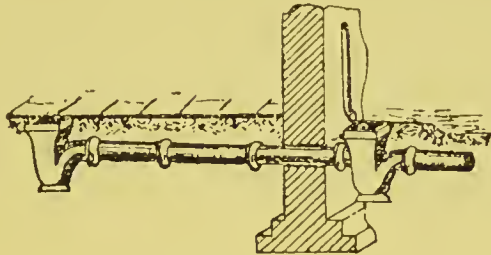


FIG. 79.

ments intended for the storage of milk or food, it is well to leave the rooms entirely undrained. The floors can be effectually cleaned, and any spilled water removed by the proper use of a mop or floor-cloth.

10. A person who shall erect a new building shall cause every pipe in such building for carrying off waste water from every lavatory or sink (not being a slop sink or urinal constructed or adapted to be used for receiving any solid or liquid excremental filth) to a sewer, to be constructed of lead, iron or stoneware, and to be trapped immediately beneath such lavatory or sink by an efficient syphon trap, which shall be constructed of lead, iron or stoneware, with adequate means for inspection and cleansing, and which shall be ventilated into the external air whenever such ventilation may be necessary to preserve the seal of such trap.

Material of
waste pipes.

Traps to waste
pipes.

He shall not construct or fix in or in connection with such waste pipe, lavatory, or sink, any trap of

the kind known as a bell-trap, a dip-trap, or a D-trap.

Waste pipes to
discharge in
the open air.

He shall cause every pipe in such building for carrying off waste water to a sewer to be taken through an external wall of such building, and to discharge in the open air over a properly-trapped gully or into such a gully above the level of the water in the trap thereof, or over a channel leading to such a gully.

NOTE.—This by-law does not provide for bath wastes: to be constructed of any particular material, nor to be trapped. The intention of this omission is not obvious.* Bath wastes must, however, under the last paragraph of the by-law, be made to discharge into the open air, over a gully trap, or, as permitted by By-law 3, into a hopper head on a rain-water pipe. The waste pipes from lavatories and sinks must, however, be constructed of lead, iron, and stoneware piping. Of these, lead is preferable to all others, being easier to manipulate, smoother in the interior, and more lasting than either of the two other permitted materials. Stoneware piping has a further disadvantage in that the piping is difficult to obtain of small diameter. Whilst the by-law does not prescribe the sizes of the wastes, it may be pointed out that they should be as small as possible and practical, in order, on the one hand, to ensure their self-cleansingness, and, on the other, to preclude the possibility of chokage. The

* In *Liverpool* bath wastes, cistern overflows, and safe pipes are required to be trapped. In the case of the two latter the requirement is hardly necessary if the pipes be otherwise properly treated, since it is only under exceptional circumstances that their traps would receive the water necessary to maintain the "seal." The traps in these cases would rather tend to accumulate dust and dirt.

most suitable diameters for waste pipes and their traps are :—

For baths	... ..	1½ in. to 2 in.
For pantry and draw-off sinks	... ..	1½ in.
For scullery sinks...	... ..	1½ in. to 2 in.
For lavatories	... ..	1½ in. to 1½ in.

Each fitting must be trapped immediately under its outlet by an efficient *syphon* trap, which must also be

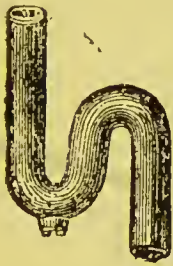


FIG. 80.



FIG. 81.



FIG. 82.

made of lead, iron, or stoneware, and which must be provided with adequate means for inspection and cleansing. Here, again, lead is preferable to the other two materials permitted. Three types of lead syphon traps are shown in Figs. 80, 81, and 82, which illustrate an "S"



FIG. 83.



FIG. 84.



FIG. 85.

trap, a "P" trap, and a "U" trap respectively. As will be seen from the illustrations, the means of access for inspection and cleansing are provided by screwed caps soldered to the bottoms of the traps. Sections of the bell trap, dip-trap, and D trap prohibited by the by-law

are shown in Figs. 83, 84, and 85. The latter depicts the foul condition in which D traps are generally found after having been used for a short time. The term "dip-trap" will be held to include such traps as are shown in Figs. 86 and 87, in which the trap is formed by the dip of a pipe or lip into the water contained in the trap. It is, however, hardly necessary to draw attention to these points, as the by-law distinctly prescribes the use of *syphon* traps. Mechanical traps (such as shown in Figs. 88 and 89), whether shaped as a syphon or not, should also be avoided, as they are always the reverse of cleanly, and generally apt to get out of order.

The by-law also requires traps to be ventilated, should that be necessary to preserve the seal of such trap. The water seal is apt to be destroyed by two causes :



FIG. 86.



FIG. 87.

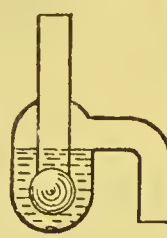


FIG. 88.

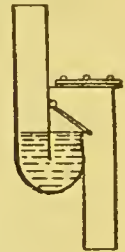


FIG. 89.

(1) By syphonage, in which the water contained by one trap is drawn out therefrom through the discharge of another fitting on the same waste pipe ; and (2) by momentum, in which the water is drawn out of the trap by its own impetus. This generally occurs when the waste pipe is comparatively long and vertical. The ventilation of traps is, however, desirable in all cases, in order that a current of fresh air may circulate through the waste pipe, disperse any gases which may be formed in the pipe, and render innocuous any deposits which may take place therein. The ventilation pipe must be branched out from near the crown of the trap, on the *outlet* side thereof, and should be of the same diameter as the waste pipe, or one size smaller. Various modes

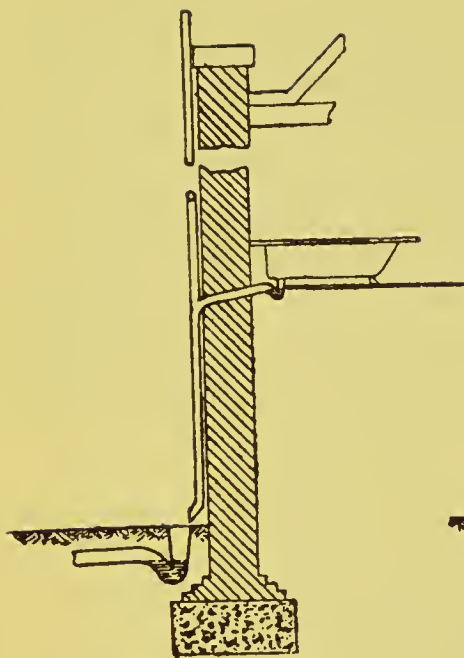


FIG. 90.

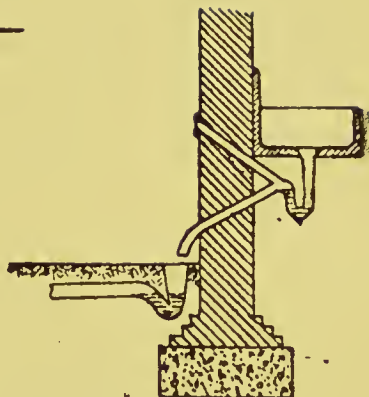


FIG. 91.

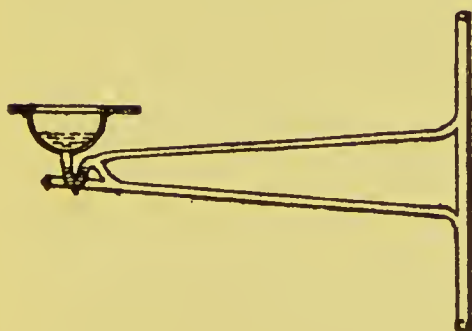


FIG. 92.

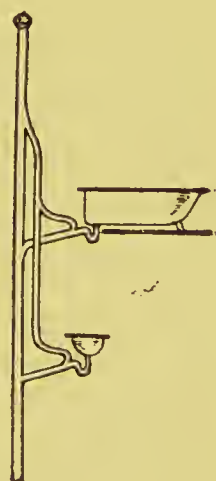


FIG. 93.

of ventilating traps are shown in Figs. 90 to 93. From these it will be seen that the ventilation pipe from the trap need not necessarily be kept separate, but may be branched into the waste pipe at some distance above the level of the highest fitting discharging therein. Also, that the same ventilation pipe may be connected to more than one trap.

The third paragraph of the by-law contains the important provision that waste pipes must be led to discharge into or over surface traps fixed *outside* the house in a manner similar to that which has been explained with regard to rain-water pipes, and for the same reasons. (See note to By-law 3). The by-law also

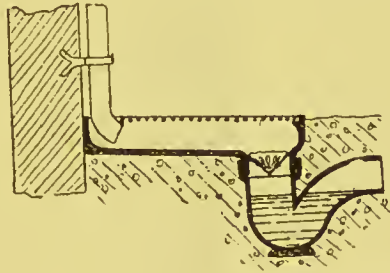


FIG. 94.

permits the pipes to discharge into a channel leading to such a gully trap—as in Fig. 94.* These channels are recommended in the Model By-laws of the Local Government Board, but it has been found in practice that they require much attention, as they speedily become coated with grease, soap-suds, and other filth. In actual practice they are therefore generally avoided. Nor are they necessary in the case of waste pipes properly ventilated above the eaves of the roof (as in Fig. 90), although they may have been desirable formerly when fittings were not trapped, gully traps of large and uncleanly type used, and the double disconnection of

* In *Manchester, Birmingham, Dublin, and Belfast* this channel is obligatory.

waste pipes much more frequently adopted than at the present time. This double disconnection was arrived at by inserting hopper heads on the waste pipes, as shown in Fig. 95, and as these were frequently near windows, it was desirable to discharge the waste pipe at some distance from the gully trap, in order, as far as possible, to keep out of the waste pipe any drain air which might issue at that point. Double disconnection is not, however, desirable, nor is it strictly in accordance with

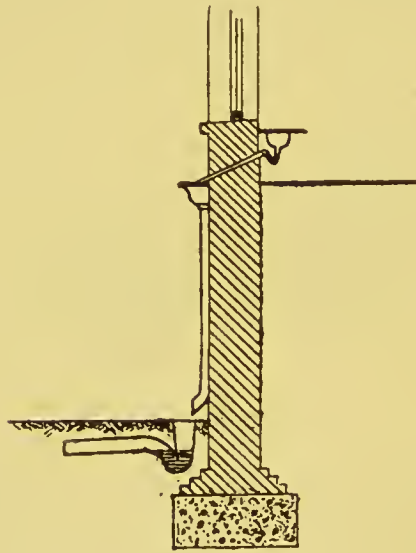


FIG. 95.

the third paragraph of the by-law, which also implies a prohibition against the discharge of waste pipes into eaves, gutters, flats, or roofs. These modes of discharge are objectionable, as the gutters, roofs, hopper heads, &c., and the piping from them are speedily covered with grease and other filthy matter, emanations from which will be drawn into the house through windows and other apertures near the points at which the gases escape.

Although the third clause of the by-law states that a waste pipe must be taken through an external wall, so

that its outlet will be outside the house, it does not specify at which point. A waste pipe inside the house is therefore legal, so long as it discharges outside the house. Every effort should nevertheless, be made to fix as much as possible of the waste pipes outside the house, as fouled pipes of whatever description are not desirable in the interior of a dwelling. The reason is, of course, that they are liable to be damaged and to be ventilated into the house should they be fractured.

11. Any person who shall provide a soil pipe in Soil pipe connection with a new building for the purpose of conveying to a sewer any solid or liquid excremental filth or shall for that purpose construct a soil pipe in connection with an existing building, shall, whenever practicable, cause such soil pipe to be situated outside such building, and shall construct such soil pipe in drawn lead or of heavy cast iron. Provided that in any case where it shall be necessary to construct such soil pipe within such building, he shall construct such soil pipe in drawn lead with proper wiped plumbers' joints, and so as to be easily accessible. *Situation and material.*

He shall construct such soil pipe, whether inside or outside the building, so that its weight, if the pipe be of lead, and its thickness and weight, if the pipe be of iron, in proportion to its length and internal diameter, shall be (see table on page 110). *Thickness and weight.*

If he shall construct such soil pipe of cast iron with socket joints, he shall cause such joints to be not less than 2½ in. in depth and to be made with molten lead properly caulked, and he shall also *Joints.*

Diameter.	Lead.	Iron.	
	Weight per 10ft. length, not less than	Thickness of metal, not less than	Weight per 6ft. length (including socket and beaded spigot or flanges—the socket not to be less than $\frac{1}{4}$ in. thick), not less than
$3\frac{1}{2}$ inches	65 lbs.	$\frac{3}{16}$ inch	48 lbs.
4 „	74 „	$\frac{3}{16}$ „	54 „
5 „	92 „	$\frac{1}{4}$ „	69 „
6 „	110 „	$\frac{1}{4}$ „	84 „

cause the annular space for the lead, in the case of $3\frac{1}{2}$ in. and 4 in. pipes, to be not less than $\frac{1}{4}$ in. in width, and, in the case of 5 in. and 6 in. pipes, to be not less than $\frac{3}{8}$ in. in width. If he shall construct such soil pipe with flange joints, he shall cause such joints to be securely bolted together with some suitable insertion.

No connections with rain water and waste pipes

He shall construct such soil pipe, whether inside or outside the building, so that it shall not be connected with any rain-water pipe or with the waste of any bath, or of any sink other than that which is provided for the reception of urine or other excremental filth, and he shall construct such soil pipe so that there shall not be any trap in such soil pipe or between the soil pipe and any drain with which it is connected.

No traps.

Diameter

He shall cause such soil pipe, whether inside or outside the building, to be circular and to have an

internal diameter of not less than $3\frac{1}{2}$ in., and to be continued upwards without diminution of its diameter, and (except where unavoidable) without any bend or angle being formed in such soil pipe, to such a height and in such a position as to afford by means of the open end of such soil pipe a safe *Outlet*. outlet for foul air.

NOTE.—This by-law prescribes the positions, materials, dimensions, and general construction of soil pipes. The term “soil pipe” is used in its widest sense, and includes, in addition to the outfall pipe from water closets, also the waste pipes of housemaids’ slop sinks and urinals (see By-law 18).

Whenever practicable, soil pipes *must* be fixed on the external face of outside walls; soil pipes within the house being permitted *only* when no other position is available. Speaking generally, it is almost always possible to provide outside soil pipes; but it has been found necessary to frame the by-law in such a manner that a certain amount of discretion is allowed to local sanitary authorities, it being conceivable that cases may arise in which the construction of an outside soil pipe in connection with old buildings may be attended by serious difficulties. In new buildings there should be no difficulty in avoiding internal soil pipes. Should internal soil pipes be necessary, the by-law requires them to be constructed of drawn lead of the substance specified in the second paragraph of the by-law. The piping must also be jointed by means of wiped solder joints (see Figs. 96 and 97), and must be fixed in such a manner and position that all parts may be accessible. It will also be an advantage to fix the piping in visible positions, so that any damage which may occur may be readily observed.

External soil pipes must be constructed of drawn lead piping of the substance specified in the table of weights

given, or of cast iron piping, the minimum weight and substance of which is prescribed in the same table. This piping is somewhat lighter than that required for underground drains by By-law 4, but the dimensions and nature of the joints are the same. As in the case of iron drains, and perhaps even more so, it is desirable to use socketed pipes in preference to flanged pipes. The disadvantages of flange joints have already been stated in the Note to By-law 4 (see page 72), and need no repetition. The by-law does not prescribe the nature of joints required for external *lead* soil pipes, but these should be wiped solder joints,

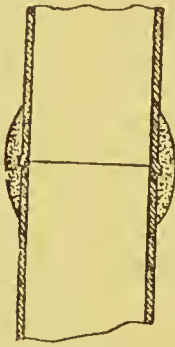


FIG. 96.

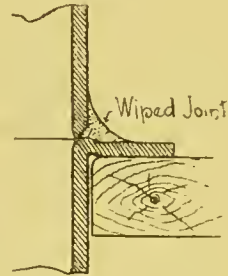


FIG. 97.

as in the case of internal soil pipes. It need hardly be pointed out that these joints are the strongest and most reliable of all the joints available for lead piping. An internal lead soil pipe must, as already stated, be constructed of lead and have proper wiped solder joints, to comply with the by-law.

The fourth clause of the by-law requires all soil pipes to be kept separate from piping receiving rain-water or waste-water from sinks, lavatories, and baths. That is, soil pipes may not discharge into or receive the discharge of any pipe other than a soil pipe. The same paragraph prohibits all traps, either in the course of the soil pipe itself, or at the foot thereof, in order that soil pipes may

DRAINAGE PLAN.

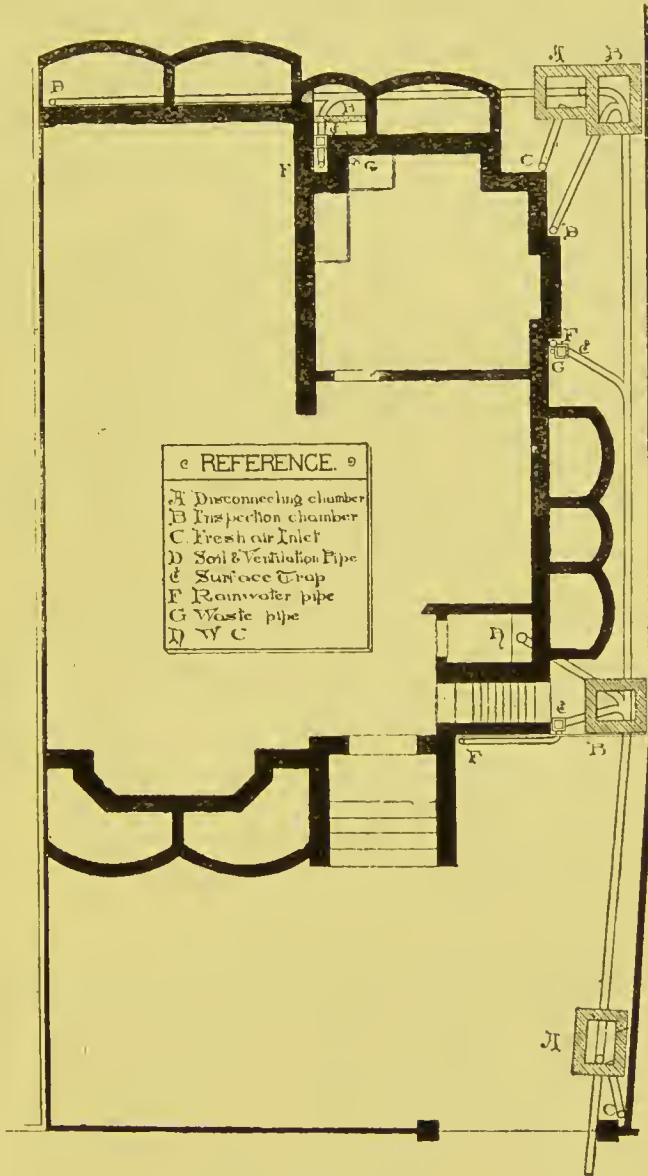


FIG. 98.

in all cases serve as ventilators for the drains into which they discharge. The by-law does not, however, prohibit the trapping off of a branch drain, receiving a soil pipe, from the main drain (as in Fig. 98) should that be found desirable. Should this be done, an air inlet must be provided on the soil pipe side of the trap, as shown, in order to supply separate means of ventilation for the branch drain and soil pipe. The main drain must then also be ventilated independently of the soil pipe.

The fifth paragraph requires soil pipes to be circular in section, and not less than $3\frac{1}{2}$ in. in diameter.* This dimension applies only to soil pipes from water closets. Soil pipes from urinals and slop sinks are, by By-law 18, required to be not less than 3 in. in diameter. Although the by-laws do not prescribe the maximum diameter permissible, it may be pointed out in this note that it is not desirable to provide soil pipes of greater diameter than 4 in. in the case of water closets and slop hoppers, and 3 in. in the case of urinals. Larger pipes will be found uncleanly, as the available flow through them will be insufficient to keep them free of deposits. A 4 in. soil pipe will also be sufficiently large for the reception of numerous fittings, even in the highly improbable event of all these fittings being used simultaneously. Each soil pipe must be continued upward without diminution in its diameter, and, if possible, without any bends or angles, to such a point as may be suitable for the safe outlet of foul air. The reasons for these requirements are the same as those discussed in the annotation to the eighth by-law.

12. Any person who shall connect a lead soil pipe, waste pipe, ventilating pipe, or trap with an iron pipe or drain communicating with a sewer, shall insert between such lead soil pipe, waste pipe

Connection of
lead soil pipe,
&c., with iron
drain, &c.

* In *Liverpool, Manchester, Birmingham, Dublin, and Belfast*, &c., the minimum diameter is fixed at 4 inches.

or trap, and such iron pipe or drain, a flanged thimble of copper, brass, or other suitable alloy, and shall connect such lead soil pipe, waste pipe or trap with such thimble by means of a wiped joint or overcast metallic joint, and shall connect such thimble with such iron pipe or drain by means of a joint made with molten lead, properly caulked; provided always that it shall be sufficient if he shall connect the lead soil pipe, waste pipe, ventilating pipe, or trap with the iron pipe or drain in an equally suitable and efficient manner.

NOTE.—The object of the “thimble” or “sleeve piece,” which this by-law requires in the jointing of a

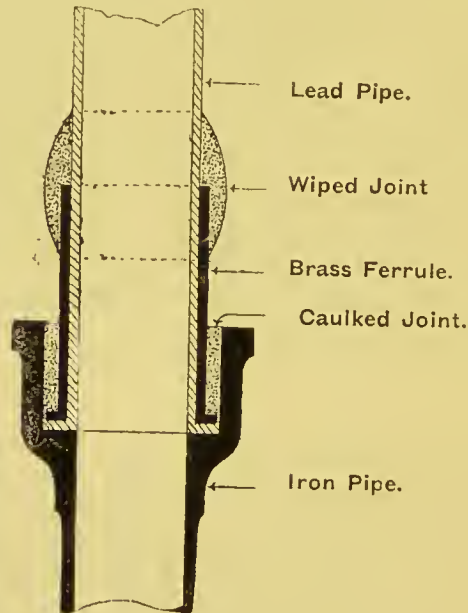


FIG. 99.

lead pipe to one of iron, is to prevent the lead pipe from being damaged or buckled in the process of jointing and also to enable a strong and lasting joint to be made. The lead pipe should be passed through this "thimble" and dressed up over the flange. The upper end of the thimble must then be joined to the lead pipe by means of a wiped or overcast solder joint. The pipe and ferrule are inserted into the socket of the iron pipe and the joint made with molten lead, well caulked, in the same manner as a joint between two iron pipes. A section of the completed joint is shown in Fig. 99.

The by-law will also be complied with if the lead pipe is connected to the iron pipe "in an equally suitable and efficient manner." This saving clause has probably been added to this and the four following by-laws in order that new and efficient inventions may be utilised without contravention of the by-laws. In the case of the particular joint to which this by-law refers, there is probably, at present, no other connection at once so simple and efficient.

13. Any person who shall connect a stoneware or semi-vitrified ware trap or pipe with a lead soil pipe, waste pipe or trap communicating with a sewer, shall insert between such stoneware or semi-vitrified ware trap or pipe and such lead soil pipe, waste pipe or trap, a brass socket, and shall insert such stoneware or semi-vitrified ware trap or pipe into such socket, making the joint with Portland cement, and shall connect such socket or appliance with the lead soil pipe by means of a wiped or overcast metallic joint; provided always that it shall be sufficient if he shall connect the stoneware or semi-vitrified ware trap or pipe with the lead soil pipe,

Connection of
stoneware trap
of closet, &c.,
with lead soil
pipe, &c.

waste pipe or trap, in an equally suitable and efficient manner.

NOTE.—An example of a brass socket which would comply with the requirements of this by-law, is shown in



FIG. 100.

Fig. 100. The narrow or outlet end of the socket must be connected to the lead pipe by means of a wiped or

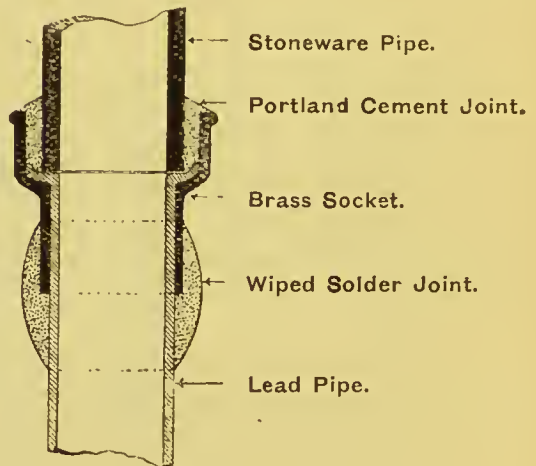


FIG. 101.

overcast solder joint, or other metallic joint; the lead pipe being preferably passed through the narrow portion, and

tafted into the bottom of the socket. The stoneware trap outlet or pipe is then inserted, and the joint made with Portland cement, which should preferably be used neat. The complete joint is shown in Fig. 101. A copper socket, or one made of any other suitable alloy, would also be permitted, although the by-law only mentions brass sockets.

In this by-law, as in the one preceding, it shall be deemed sufficient if the connection is made "in

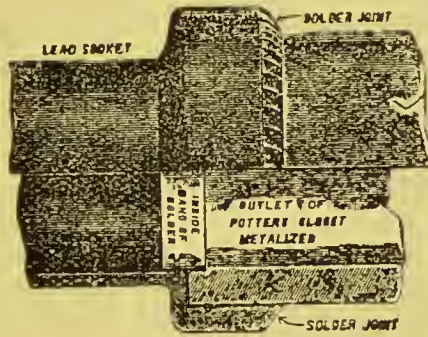


FIG. 102.

an equally suitable and efficient manner." Under this clause, the *Metallo-Keramic* and similar joints are permissible. These joints consist of a metallic coating burnt into the outlet of the stoneware pipe, by means of which it is possible to connect the stoneware pipe to the lead pipe direct by a solder joint (see Fig. 102).

14. Any person who shall connect a lead soil pipe, waste pipe, ventilating pipe, or trap with a stoneware or semi-vitrified ware pipe or drain communicating with a sewer, shall insert between such lead soil pipe, waste pipe or trap and such stoneware or semi-vitrified ware pipe or drain, a flanged

Connection of
lead soil pipe,
&c., with
stoneware
drain, &c.

thimble of copper, brass, or other suitable alloy, and shall connect such lead soil pipe, waste pipe, or trap with such thimble by means of a wiped or overcast metallic joint, and shall insert the flanged end of such thimble into a socket on such stoneware or semi-vitrified ware pipe or drain, making the joint with Portland cement; provided always that it shall be sufficient if he shall connect the lead soil pipe, waste pipe, ventilating pipe or trap with the stoneware or semi-vitrified ware pipe or drain in an equally suitable and efficient manner.

NOTE.—This by-law is precisely similar to By-law 12, the only difference being that the jointing material used for the connection of the thimble with the drain pipe, &c., must be Portland cement (preferably used neat) instead of molten lead, which would, of course, be unsuitable for the stoneware or semi-vitrified ware pipe or drain.

Connection of
iron soil pipe,
&c., with
stoneware
drain, &c.

15. Any person who shall connect an iron soil pipe, waste pipe, ventilating pipe, or trap with a stoneware or semi-vitrified ware pipe or drain communicating with a sewer, shall insert the beaded spigot end of such iron soil pipe, waste pipe or trap into a socket on such stoneware or semi-vitrified ware pipe or drain, making the joint with Portland cement; provided always that it shall be sufficient if he shall connect the iron soil pipe, waste pipe, ventilating pipe or trap with the stoneware or semi-vitrified ware pipe or drain in an equally suitable and efficient manner.

NOTE.—The joint required by this by-law is extremely simple. The beaded spigot-end of the iron pipe must be inserted into the socket of the stoneware pipe, and the

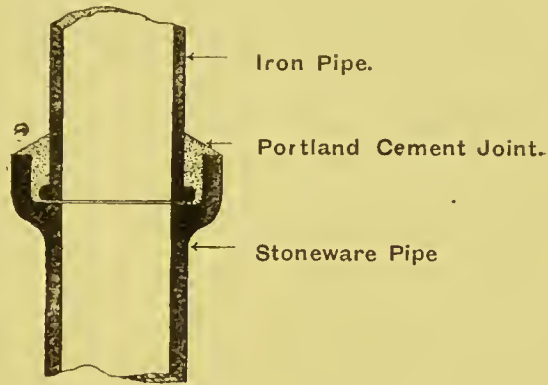


FIG. 103.

joint made with Portland cement, as in Fig. 103. Should the iron spigot not be provided with a bead on its end,

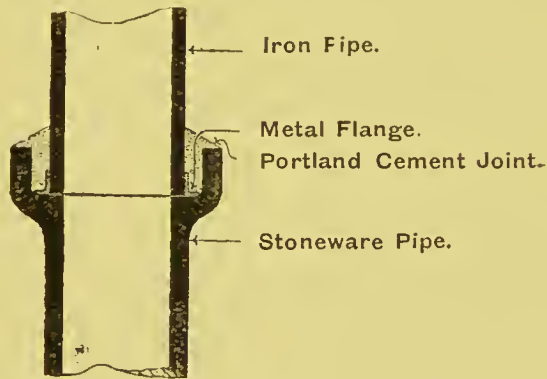


FIG. 104.

or should the bead be too small to cover the entire opening in the bottom of the stoneware socket, a metal flange, fitting closely to the iron pipe, should be provided

(as in Fig. 104) to prevent the cement from finding its way into the stoneware pipe.

Connection of
stoneware trap
of closet, &c.,
with iron soil
pipe, &c.

16. Any person who shall connect a stoneware or semi-vitrified ware trap or pipe with an iron soil pipe, waste pipe, trap or drain communicating with a sewer, shall insert such stoneware or semi-vitrified ware trap or pipe into a socket on such iron soil pipe, waste pipe, trap or drain, making the joint with Portland cement; provided always that it shall be sufficient if he shall connect the stoneware or semi-vitrified ware trap or pipe with the iron soil pipe, waste pipe, trap or drain in an equally suitable and efficient manner.

NOTE.—This by-law requires that the connection between a stoneware and an iron pipe shall be made with Portland cement, after the stoneware pipe has been inserted into the socket of the iron pipe. An iron pipe with a specially large socket should be utilised for this purpose, in order to provide sufficient space round the stoneware pipe for the cement joint. Were an ordinary socket used, the annular space available for the cement would probably not exceed $\frac{1}{16}$ th of an inch in width, whilst a minimum space of $\frac{5}{16}$ ths is desirable. Should there be difficulty in obtaining a specially wide socket, a brass socket—Fig. 100—may be joined to the iron pipe by means of a caulked lead joint, and the stoneware connected to the brass socket with Portland cement. The insertion of the brass socket should, however, be avoided if at all possible.

Ventilation of
trap of water-
closet.

17. Any person who shall construct any water closet, the soil pipe of which shall communicate

with any sewer and shall be in connection with any other water-closet, shall cause the trap of every such water-closet to be ventilated into the open air at a point as high as the top of the soil pipe, or into the soil pipe at a point above the highest watercloset connected with such soil pipe, and so that the ventilating pipe shall have in all parts an internal diameter of not less than two inches and shall be connected with the arm of the soil pipe or the trap at a point not less than three and not more than twelve inches from the highest part of the trap and on that side of the water seal which is nearest to the soil pipe. He shall cause the joint between the ventilating pipe and the arm of the soil pipe or the trap to be made in the direction of the flow.

He shall construct such ventilating pipe in drawn lead or of heavy cast iron. Provided that in any case where it shall be necessary to construct such ventilating pipe within a building he shall construct such ventilating pipe in drawn lead.

He shall construct such ventilating pipe, whether inside or outside a building, so that if the pipe be of lead its weight shall not be less than 45 lbs. per 12 feet length, and if the pipe be of iron its thickness shall not be less than $\frac{3}{16}$ inch and its weight not less than 25 lbs. per 6 feet length.

He shall in all cases cause the joints in and the connections to such ventilating pipe to be made in the same manner as if such ventilating pipe were a soil pipe.

NOTE.—The object of ventilating the traps of water-closets when more than one discharge into the same soil-pipe, is to prevent the water of one closet trap being syphoned or sucked out through the discharge of the other closet. On discharging the contents of the upper closet, shown in Fig. 105, for instance, the falling water will create a vacuum in the branch from the lower closet, and thus syphon out the contents of its trap. To prevent this, the trap must be ventilated as required by



FIG 105.

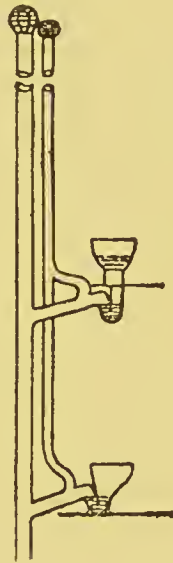


FIG. 106

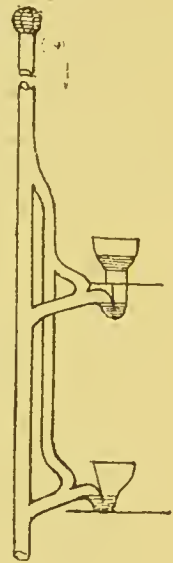


FIG. 107.

the by-law, and illustrated in Figs. 106 and 107. Another use for the ventilation pipe is that it prevents the air in the soil pipe being so compressed, when discharges take place from the upper closet, as to burst through the water-seal of the lower trap.

Although the by-law requires ventilation pipes to be fixed only in cases where more than one closet discharge into the same soil-pipe, it is advisable to provide them also in cases where there is only one closet, should the branch from the closet trap to the soil-pipe be of appre-

cial length. In such a case the water-seal of the trap is liable to be destroyed by "momentum," by which is meant that the water of the trap is carried out by the momentum or impetus due to its own mass and velocity. Moreover, the ventilation pipe will have the effect of carrying off any vitiated air which might otherwise be absorbed by and gradually passed through the water contained by the trap or traps.

For the termination of the ventilation pipes, two alternatives are allowed by the by-law—that is, the main trap-ventilation pipe must either be carried up to a point as high as the top of the soil-pipe, as in Fig. 106, or it must be branched into the latter at a point above the highest water-closet, as in Fig. 107. The latter method is perhaps the one to be preferred. Not only is this



FIG. 108.



FIG. 109.

usually less expensive, but, in addition, the point from which air is drawn into the anti-syphonage pipe is brought much nearer to the traps; whilst some advantage is also gained from the inrush of air caused by the discharges of the closets.

The by-law further requires that the ventilation pipe be not less than 2in. in diameter, and branched into the outlet side of the trap, in the direction of the flow, at a point not more than 12in. and not less than 3in. from the highest part of the trap. (See Fig. 108.) Unless these latter precautions are taken, the sewage discharged by the closet is liable to be washed up into the ventilation pipe, which it will tend to choke. This will be apparent on reference to Fig. 109.

As to the position and construction of the ventilation pipes, the by-law states that they must, in all respects, be

similar to those of soil-pipes, the requirements as to which are given in By-law 11. The diameter of the piping being smaller than that made use of for soil-pipes, the required weights of the pipes—given in the fourth paragraph of this by-law—are proportionately less, but the substance and strength of the pipes are the same.

Although the by-law permits the use of iron pipes, it should be made a rule to use lead piping only, as iron ventilation pipes—which, of course, receive no regular flush—are liable to choke with internal rust. The reasons for this have been already stated in the Note to the eighth by-law on page 99. The lead pipes are also easier to bend and manipulate generally. Should iron be used, it must be protected both on the interior and the exterior surfaces by some lasting anti-corrosive substance or solution.

Slop sinks for
filth and ur-
inals.

18. A person who shall erect a new building, and shall construct in connection with such building a slop sink or urinal constructed or adapted to be used for receiving any solid or liquid excremental filth for conveyance to any sewer, shall construct or fix immediately beneath such slop sink or urinal, an efficient syphon trap, so constructed as to be capable of maintaining a sufficient water seal between such slop sink or urinal and any drain, soil pipe or waste pipe in connection therewith. He shall not construct or fix in or in connection with such slop sink or urinal any trap of the kind known as a bell trap, a dip trap or a D trap.

He shall as regards the ventilation of the trap of such slop sink or urinal and the construction of the waste pipe of such slop sink or urinal comply with all the requirements of the preceding by-laws

which are applicable to the ventilation of the trap of a water-closet and the construction of a soil pipe, always provided that the internal diameter of the waste pipe of any such slop sink or urinal shall not be less than 3 inches, and where the internal diameter of such waste pipe is 3 inches, the weight of such pipe for every 10 feet of length shall, if such waste pipe be constructed of lead, be not less than 60 lbs., and if such waste pipe be constructed of cast iron the weight of such pipe for every 6 feet of length shall not be less than 40 lbs.

NOTE.—As housemaids' slop sinks are provided for the reception of bedroom slops and similar polluted waters, the by-law requires that these fittings, as also urinals, shall be looked upon and treated in every way as water-closets. The fittings must be trapped at their outlet by an efficient syphon trap, which, in the case of slop sinks, often forms part of the apparatus. Slop sinks having a separate trap are, however, preferable, as the sinks may be removed for repairs, if necessary, leaving the traps on the soil-pipe to exclude drain air from the house. Bell traps, dip traps, and D traps are banned, as in the case of other fittings—see note to By-law 10. The ventilation of the traps, and the construction of the soil-pipes from the fittings, must in all respects comply with the requirements of By-laws 17 and 11 respectively. This is necessary since these pipes are usually as foul as, and frequently fouler than, soil pipes from water closets. The diameter of the soil or waste pipe may, however, be slightly smaller than that required for soil-pipes from water-closets. The minimum diameter permitted is 3in. This should also be the maximum diameter for urinal wastes, whilst slop sink wastes should not exceed 4in., to ensure their self-cleanliness. (See also annotation to By-law 11.)

The minimum weights of pipes permissible for piping used in the construction of soil or waste pipes from slop sinks and urinals are given in the second clause of the by-law. The weights given, however, merely apply to 3-inch pipes. The substance of the piping should be proportionate for pipes of larger diameter.

Maintenance in
state of repair.

19. The owner of any building shall as respects such building at all times maintain in a proper state of repair all pipes, drains, and other means of communicating with sewers, and the traps and apparatus connected therewith.

NOTE.—By the “owner” of a building is implied the person for the time being receiving the rack-rent of the lands or premises in connection with which the word is used, whether on his own account, or as agent or trustee for any other person, or who would so receive the same if such premises were let at a rack-rent.

The expression “rack-rent” means rent which is not less than two-thirds of the full annual value of the premises out of which the rent arises; and the full annual value is to be taken to be the annual rent which a tenant might reasonably be expected, taking one year with another, to pay for the premises if the tenant undertook to pay all usual tenants’ rates and taxes, and the tithe commutation rent-charges (if any), and if the landlord undertook to bear the cost of the repairs and insurance, and other expenses (if any) necessary to maintain the premises in a state to command such rent.

Penalty

20. Every person who shall offend against any of the foregoing by-laws shall be liable for every such offence to a penalty of two pounds, and in the case

of a continuing offence to a further penalty of twenty shillings for each day after written notice of the offence given in accordance with Section 202 of the Metropolis Management Act, 1855.

21. These by-laws shall, so far as practicable, apply to any person who shall construct or reconstruct any pipe or drain or other means of communicating with sewers, or any trap or apparatus connected therewith, so far as he shall effect any such works in any building erected before the confirmation of these by-laws, as if the same were being constructed in a building newly erected.

Application of
by-laws to ex-
isting build-
ings.

NOTE.—The purport of this by-law is that sanitary arrangements existing at the time these by-laws came into force will be exempt from their requirements, so long as they remain unaltered. Should, however, through any cause, an alteration be necessary, the portion of the sanitary arrangements altered must, in alteration, be made to comply with the by-laws. For instance, should an untrapped and unventilated drain of an old house be re-laid, it must be trapped, ventilated, and laid in accordance with the by-laws, even though the house is not a “new building,” which are the words used in the by-laws. Again, an existing sink with untrapped waste discharging into a rain-water pipe is legal so long as it is unaltered. Should a new sink be substituted when, for instance, the old one is broken, and other alterations be necessary, the new sink must be trapped and the waste pipe altered, and made to discharge over a surface trap as required by the by-laws for a new sink in a newly-erected building.

For the purpose of these by-laws, the re-erecting of any building pulled down to or below the ground floor,

or of any frame building of which only the framework is left down to the ground floor, or the conversion into a dwelling-house of any building not originally constructed for human habitation, or the conversion into more than one dwelling-house of a building originally constructed as one dwelling-house only, will be considered the erection of a new building.

Definition of
"person."

22. In these by-laws the word "person" includes any body of persons whether corporate or unincorporate.

By-laws not to
apply to
City.

23. These by-laws shall not extend to the City of London.

London County Council.

BY - LAWS

MADE BY THE LONDON COUNTY COUNCIL

Under the Metropolis Management Act, 1855, Section 202, and the Metropolis Management Acts Amendment (By-Laws) Act, 1899,

Requiring persons about to construct, reconstruct, or alter the pipes, drains, or other means of communicating with sewers, or the traps and apparatus connected therewith, to deposit with the Sanitary Authority of the district such plans, sections, and particulars of the proposed construction, reconstruction, or alteration as may be necessary for the purpose of ascertaining whether such construction, reconstruction, or alteration is in accordance with the statutory provisions relative thereto, and with the by-laws made under section 202 of the Metropolis Management Act, 1855.

Construction of a drainage system as a whole.

1. (1) Every person who, in the provision of a drainage system as a whole, is about to construct the pipes, drains, or other means of communicating with a sewer, or the traps and apparatus connected therewith, shall deposit in duplicate with the sanitary authority of the district, at their office, such plans, sections, and particulars of the proposed construction as may be necessary for the purpose of enabling such authority to ascertain

Deposit of plans of intended construction of pipes, drains, or other means of communicating with sewers.

whether such construction is in accordance with the statutory provisions relative thereto, and with the by-laws made under section 202 of the Metropolis Management Act, 1855.

(2) He shall cause such duplicate plans and sections to be clearly and indelibly made on a durable material to a scale (except in the case of block plans) of not less than one inch to every sixteen feet, and shall, amongst other things, show thereon every floor of any building in connection with which such pipes or drains are to be used, and the position, form, levels and arrangement of the several parts of such building, including the roof thereof, and the size and position of every drain, manhole, gully, soil pipe, waste pipe, ventilating pipe, and rain-water pipe, and of any drain passing under such building, and the position of every bath, water-closet apparatus, slop-sink, urinal, lavatory-basin or apparatus, sink (not being a slop-sink), and trap in connection with the foregoing.

(3) He shall also show thereon the positions of all windows and other openings into the building, and the height and position of all chimneys belonging to the building within a distance of twenty feet from the open end of a soil pipe or ventilating pipe.

Deposit of
detailed description
in writing.

(4) He shall at the same time deposit in duplicate with the sanitary authority of the district, at their office, a detailed description in writing of the intended mode of constructing, jointing and fixing any such drain, manhole, gully, pipe, bath, water-

closet apparatus, sink, urinal, lavatory basin or apparatus, or trap.

(5) He shall at the same time deposit in duplicate with the sanitary authority of the district, at their office, a block plan of the premises upon which any such building is to be situated, or any such work is to be carried out (drawn to a scale of not less than one inch to every twenty-two feet), and he shall show thereon—

Deposit of block plan.

(a) The block plan of such building.

(b) The position of the whole of the buildings on the premises, and so much of the properties adjoining thereto as may be affected by the proposed work.

(c) The names of the streets or thoroughfares immediately adjoining the premises, and the number or designation of the premises.

(d) The difference of the level between the lowest floor of such building and the adjoining pavement.

(e) The level of any yard, area, or ground, or open space belonging to such premises.

(f) The lines, size, depth and inclination of the proposed drainage, and so far as can be ascertained without opening the ground, the lines, size, depth, and inclination of the existing drainage, the surface drains (if any), and if such proposed or existing drainage be in connection with a building the arrangements for the ventilation of the drains—the existing pipes and drains and the proposed pipes and

drains to be distinctively indicated by different colours.

(g) The position and form of every existing or proposed manhole or access chamber, gully, junction, bend, intercepting trap, or any connection with a sewer.

(h) The points of the compass.

Provided, nevertheless, that it shall not be necessary to deposit a block plan in any case where the plans, sections and particulars deposited in accordance with the first paragraph of this by-law clearly show the particulars hereinbefore required to be shown on a block plan.

Time of deposit
of plans, &c.

(6) The plans, sections, particulars and detailed descriptions hereinbefore mentioned shall be so deposited 15 days at least before the work is proposed to be commenced, and, in the case where a building is to be erected, before commencing the erection of such building.

Addition to, partial construction, entire or partial reconstruction, or alteration of, a drainage system.

Deposit in case
of any addition
to, partial con-
struction, entire
or partial recon-
struction or
alteration of
pipes, &c.

2. Every person who shall make any addition to, partially construct, entirely or partially reconstruct, or alter any pipes, drains, or other means of communicating with a sewer, or the traps and apparatus connected therewith, shall be deemed to have satisfied the foregoing by-law No. 1, if he shall cause a deposit to be made (in the manner therein provided) of only such plans, sections, and

particulars of the proposed addition, partial construction, entire or partial reconstruction, or alteration as may be necessary for the purpose of enabling such authority to ascertain whether such addition, partial construction, entire or partial reconstruction or alteration is in accordance with the statutory provisions relative thereto, and with any by-laws made under section 202 of the Metropolis Management Act, 1855, and, if in any case plans and sections have been previously deposited in conformity with the foregoing by-law No. 1, it shall be sufficient for him to give in writing with the deposit the date of the previous deposit, and to show the new work on the plans and sections to be deposited, and only so much of the existing work as will enable the sanitary authority to see the relative positions of the new and old work.

Provided that this by-law shall not be deemed to require the deposit of any plans, sections or particulars in the case of any repair which does not involve the alteration or the entire reconstruction of any pipe, drain, or other means of communicating with sewers or the traps and apparatus connected therewith.

Alterations of drains in cases of urgency.

3. (1) In any case in which an alteration of the drains must be carried out at once, every person who is about to carry out such alteration shall, in lieu of depositing the plans, sections, and particulars

Alterations of drains in urgent cases.

referred to in these by-laws, forthwith send to the sanitary authority of the district a notice in writing of any such proposed alteration.

(2) He shall also within two weeks of the commencement of such alteration make the deposits required by these by-laws.

Penalty.

Penalty.

4. Every person who shall offend against any of the foregoing by-laws shall be liable for every such offence to a penalty of two pounds, and in the case of a continuing offence to a further penalty of twenty shillings for each day after written notice of the offence given in accordance with section 202 of the Metropolis Management Act, 1855.

Definition of "person."

Definition of person.

5. In these by-laws the word "person" includes any body of persons whether corporate or unincorporate.

Exemption of City.

Exemption of City.

6. These by-laws shall not extend to the City of London.

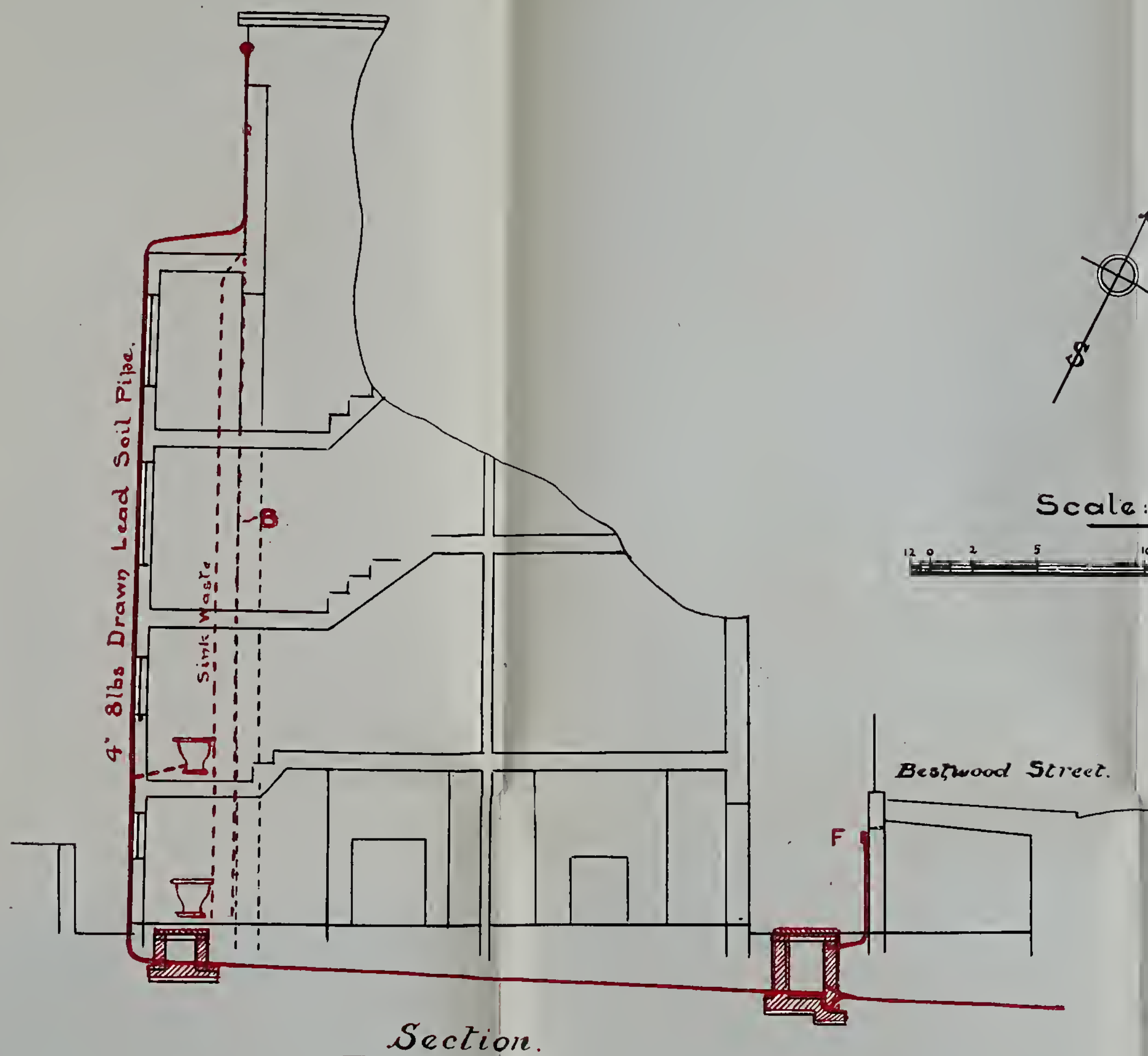
NOTE.—Little explanation is required regarding the requirements of these by-laws as to the deposit of plans, &c. The two annexed plans, one of a new drainage system in detail, and the other of a block plan, will sufficiently illustrate the kind of drawings required by the Borough Councils.

The various London Borough Councils provide proper

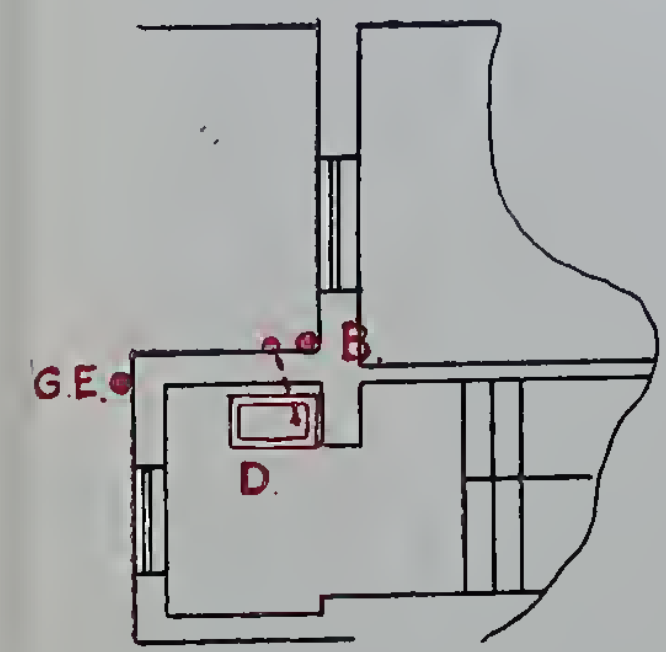
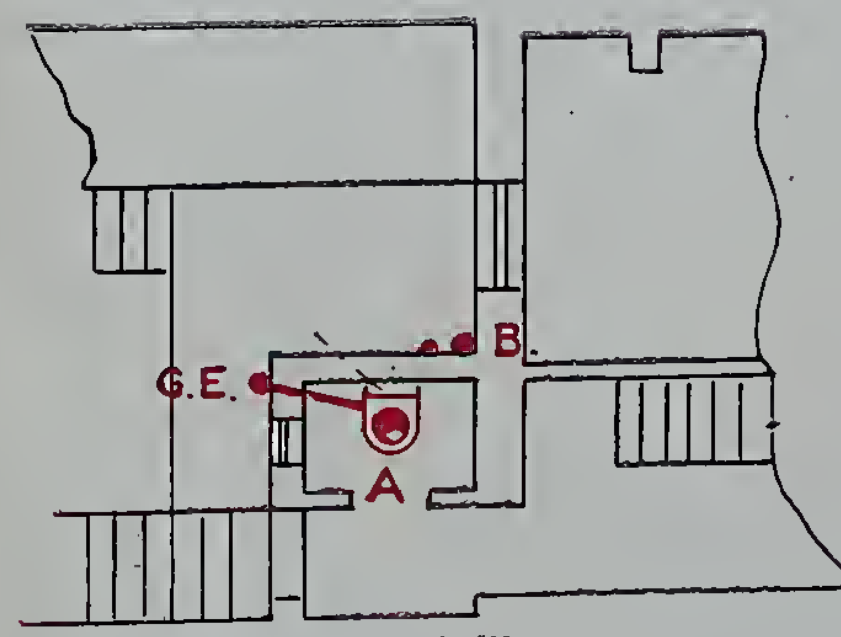
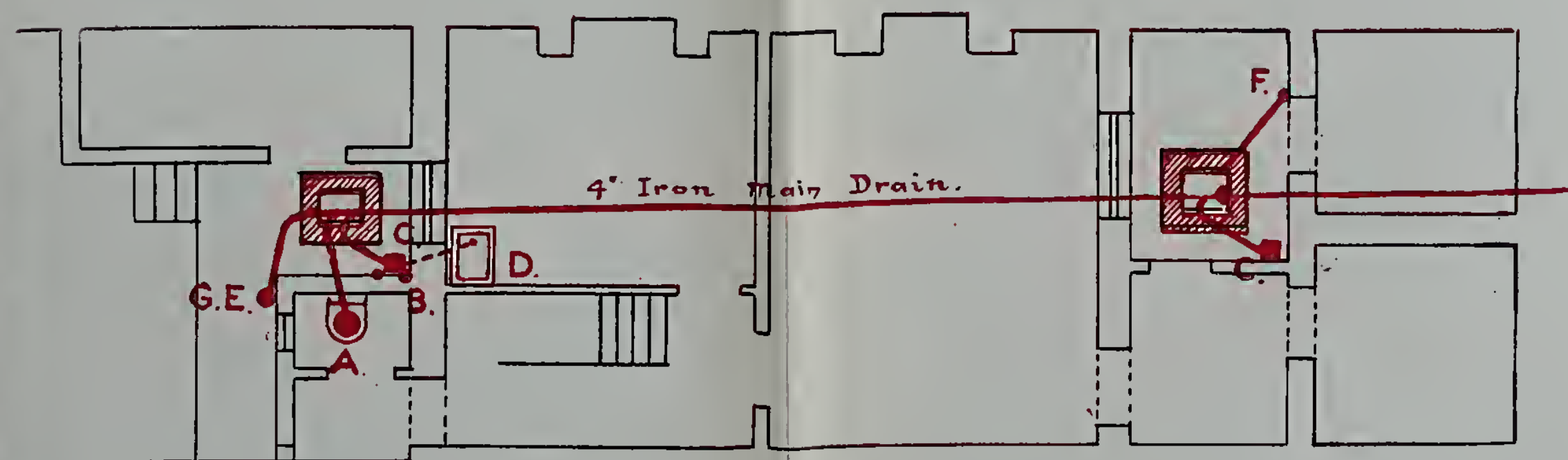
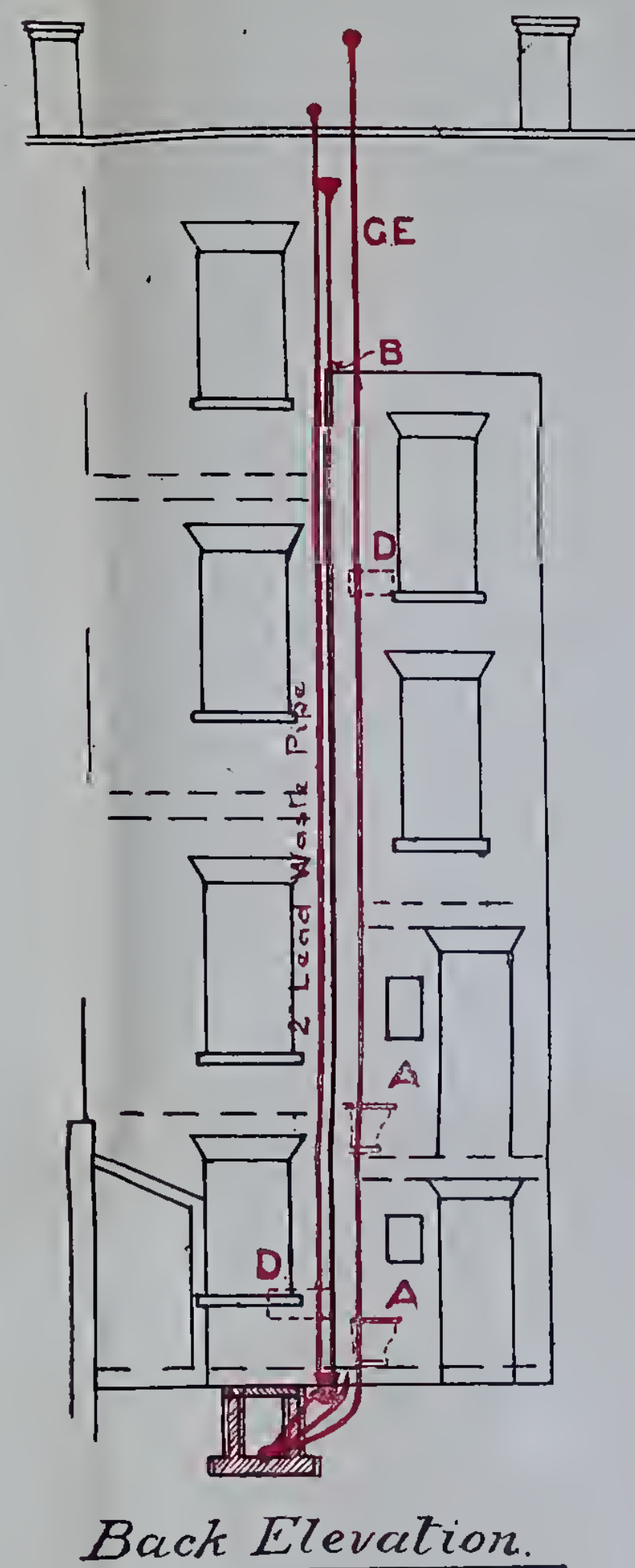
forms on which to draw the plans (a facsimile of one is shown on page 138), and reference letters are given on these which should be made use of on the plans. If the space available is insufficient for the drawings, these may be made upon tracing linen and attached to the forms. The forms contain an extract of the by-laws as to drainage, and these, in conjunction with such descriptions on the plans as "4in. cast iron drain," or "6in. stoneware drain," will be a sufficient description of the mode of construction to comply with Part 4 of By-law 1.

A block plan, such as required by the fifth section of By-law 1, is only necessary in the case of new buildings, when it should be supplied in conjunction with the detailed drainage plan. The minimum scale required by the by-law for this plan—lin. to 2½ft.—is a little curious at first sight. It is, however, a convenient one, being one-half of that of the $\frac{1}{5\frac{1}{2}8}$ ordnance map, which is drawn to a scale of 10ft. to a mile or 1in. to 44ft.

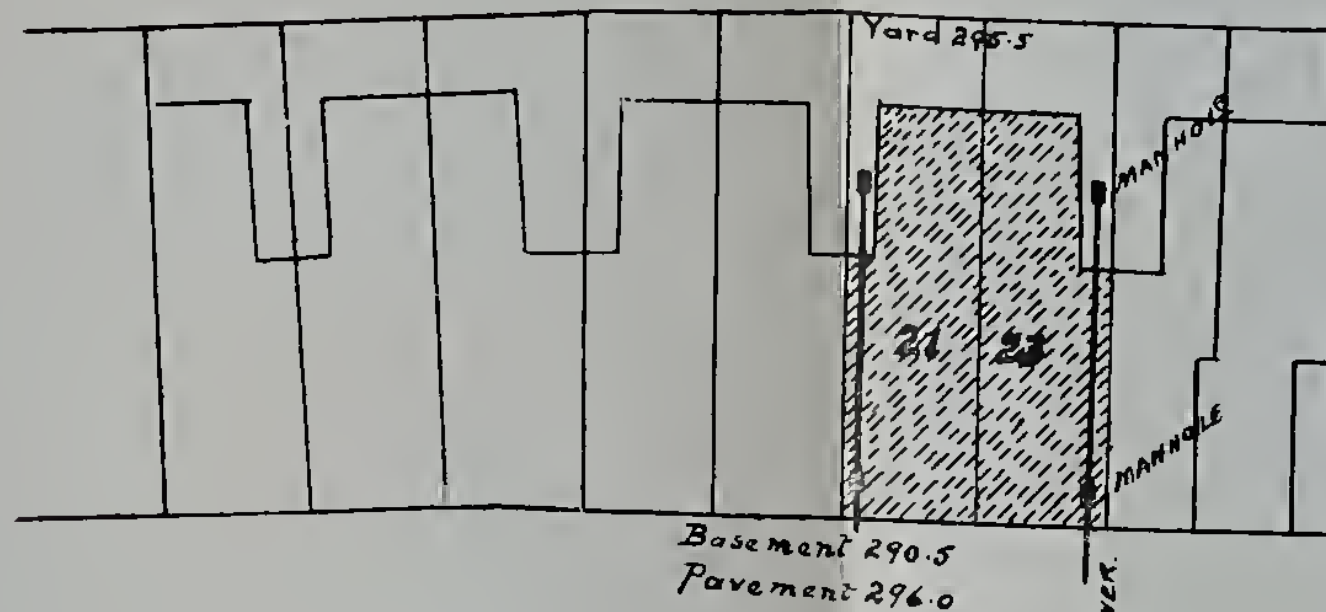
Nº 30. Bestwood Street, S.W.



Scale: 1 inch = 8 Feet



21-3 CHURCH ROAD, W.



CHURCH ROAD

STREET

P.H.



KING

SCALE of 10 50 10 20 30 40 50 100 150 FEET

BLOCK PLAN



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